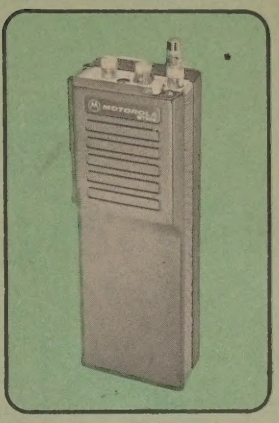
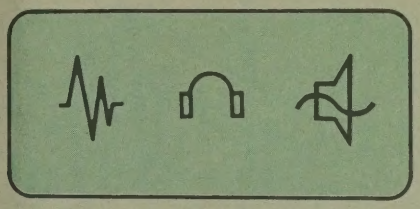
MOTOROLA JOHN THORNTON

68P81012C56-0

MT500 SERIES "HANDIE-TALKIE" PORTABLE FM TWO-WAY RADIOS





150.8-174 MHz

SUPPLEMENT TO INSTRUCTION MANUAL 68P81012C55

SPECIFICATIONS

GENERAL

	H23BBB' H33BBB'	H23BBU' H33BBU'
Current Drain – (Using 15 Vdc Supply)		
Transmit 2.0 W:	400 mA	420 mA
5.0 W:	930 mA	950 mA
• Receive:	70 mA	
• Standby:	11 mA	

• Add 3 mA for Tone PL and 3.5 mA for Digital PL

RECEIVER

Frequency Stability – (-30° C to +60° C; +25° C Ref):	±.0010% (±.0005% optional)
Channel Spacing:	30 kHz
Sensitivity –	
20 dB Quieting:	.35 uV
12 dB SINAD:	.25 uV
Squelch/PL:	.18 uV
Modulation Acceptance:	±7 kHz
Intermodulation (EIA SINAD):	70 dB
Spurious and Image Rejection:	75 dB
Selectivity (EIA SINAD):	80 dB (30 kHz) 75 dB (25 kHz)

Frequency Spacing – (Degradation)	1 MHz	2.5 MHz	5.5 MHz
20 dB Quieting:	No deg	3 dB deg	5 dB deg
Spurious:	No deg	15 dB deg	25 dB deg
Intermodulation:	No deg	5 dB deg	10 dB deg

Audio Output – (At less than 5% distortion):	500 mW

TRANSMITTER

RF Power Output –	H23BBB' H23BBU'	H33BBB' H33BBU'
15 Vdc Ni-Cad Battery:	2.0 W	5.0 W
12.7 Vdc Mercury Battery NLN6762, NLN6936:	1.0 W	2.5 W
12.0 Vdc Mercury Battery NLN6683:	0.8 W	—

Modulation – (±5 kHz for 100% modulation at 1000 Hz):	16F3
Frequency Stability – (-30° C to +60° C; +25° C Ref):	.0010% - 2.0 W (optional .0005% 2.0 W) .0005% - 5.0 W
FM Noise – (Below ±3.3 kHz deviation at 1000 Hz):	55 dB
Audio Distortion – (At 1000 Hz, 3 kHz deviation):	3%
Frequency Spacing –	
No Degradation:	1 MHz
1.5 dB Power Degradation:	2.5 MHz
3 dB Power Degradation:	5.5 MHz

MODEL TYPES				NUMBER OF CHANNELS	TYPE OF SQUELCH
BASIC		UNIVERSAL			
2 W H23BBB'	5 W H33BBB'	2 W H23BBU'	5 W H33BBU'		
1111A	---	1111A	---	1	Carrier
1112A	---	1112A	---	1	
1113A	1113A	1113A	1113A	1	
1114A	1114A	1114A	1114A	1	
1121A	---	1121A	---	2	
1122A	---	1122A	---	2	
1123A	1123A	1123A	1123A	2	
1124A	1124A	1124A	1124A	2	
1143A	1143A	1143A	1143A	4	
1144A	1144A	1144A	1144A	4	
1164A	1164A	1164A	1164A	6	
1184A	1184A	1184A	1184A	8	
3112A	---	3112A	---	1	Tone PL
3113A	3113A	3113A	3113A	1	
3114A	3114A	3114A	3114A	1	
3122A	---	3122A	---	2	
3123A	3123A	3123A	3123A	2	
3124A	3124A	3124A	3124A	2	
3143A	3143A	3143A	3143A	4	
3144A	3144A	3144A	3144A	4	
3164A	3164A	3164A	3164A	6	
3184A	3184A	3184A	3184A	8	
		6112A	---	1	Digital PL
		6114A	6114A	1	
		6122A	---	2	
		6124A	6124A	2	
		6144A	6144A	4	
		6164A	6164A	6	
		6184A	6184A	8	

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

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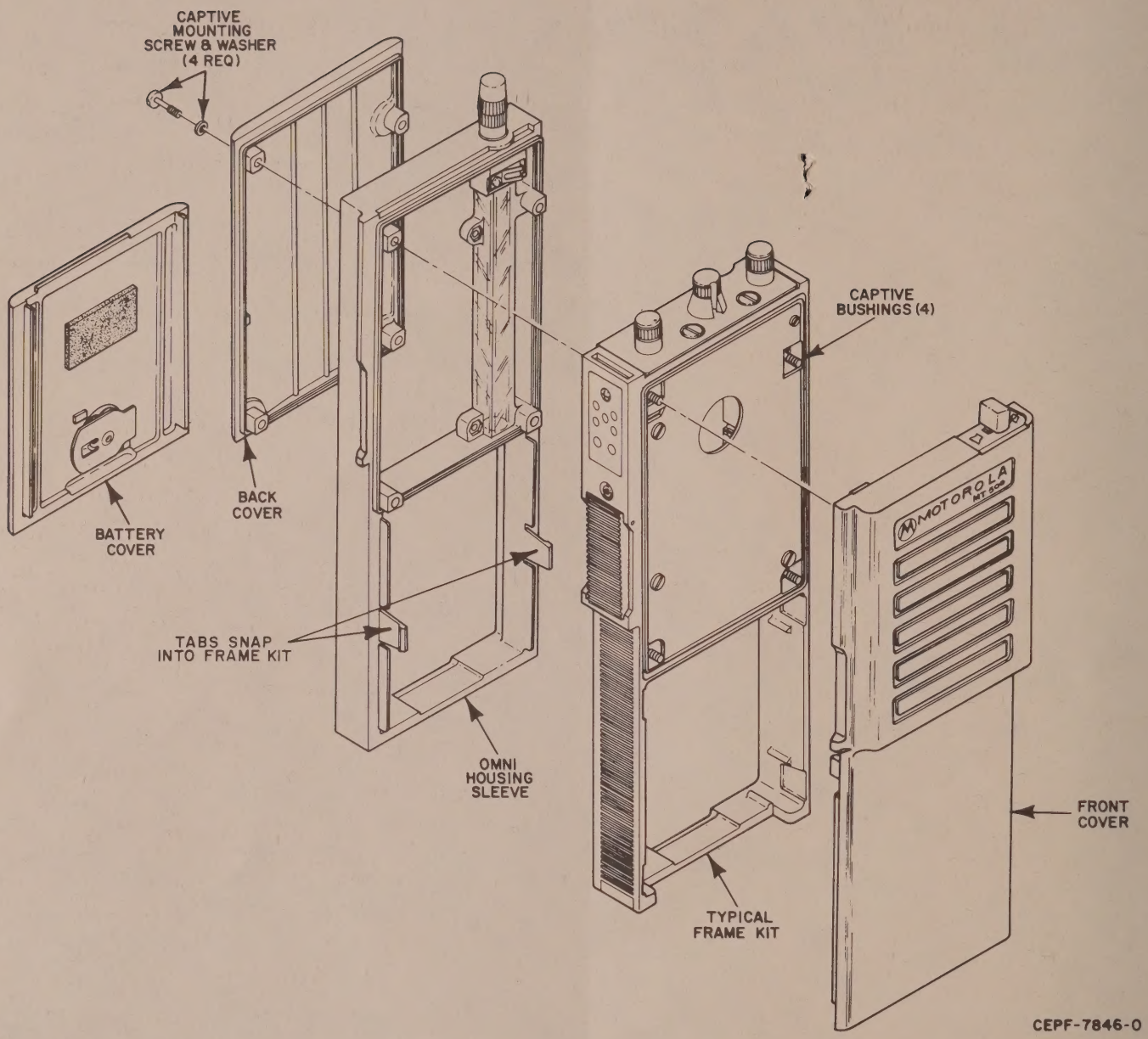
DISASSEMBLY PROCEDURE



PROCEDURE

1. TURN THE SLOTTED SCREW HEAD ON THE BATTERY COVER ONE QUARTER TURN COUNTERCLOCKWISE AND REMOVE THE BATTERY COVER.
2. REMOVE THE BATTERY.
3. LOOSEN THE FOUR CAPTIVE SCREWS HOLDING THE BACK COVER AND REMOVE THE BACK COVER.
4. REMOVE SNAP-ON SLEEVE (OMNI-HOUSING ONLY).
5. LOOSEN THE FOUR CAPTIVE BUSHINGS HOLDING THE CHASSIS FRAME TO THE FRONT COVER.
6. SEPARATE THE FRONT COVER FROM THE FRAME.
7. UNPLUG THE WIRES CONNECTING THE FRONT COVER TO THE CHASSIS FRAME.

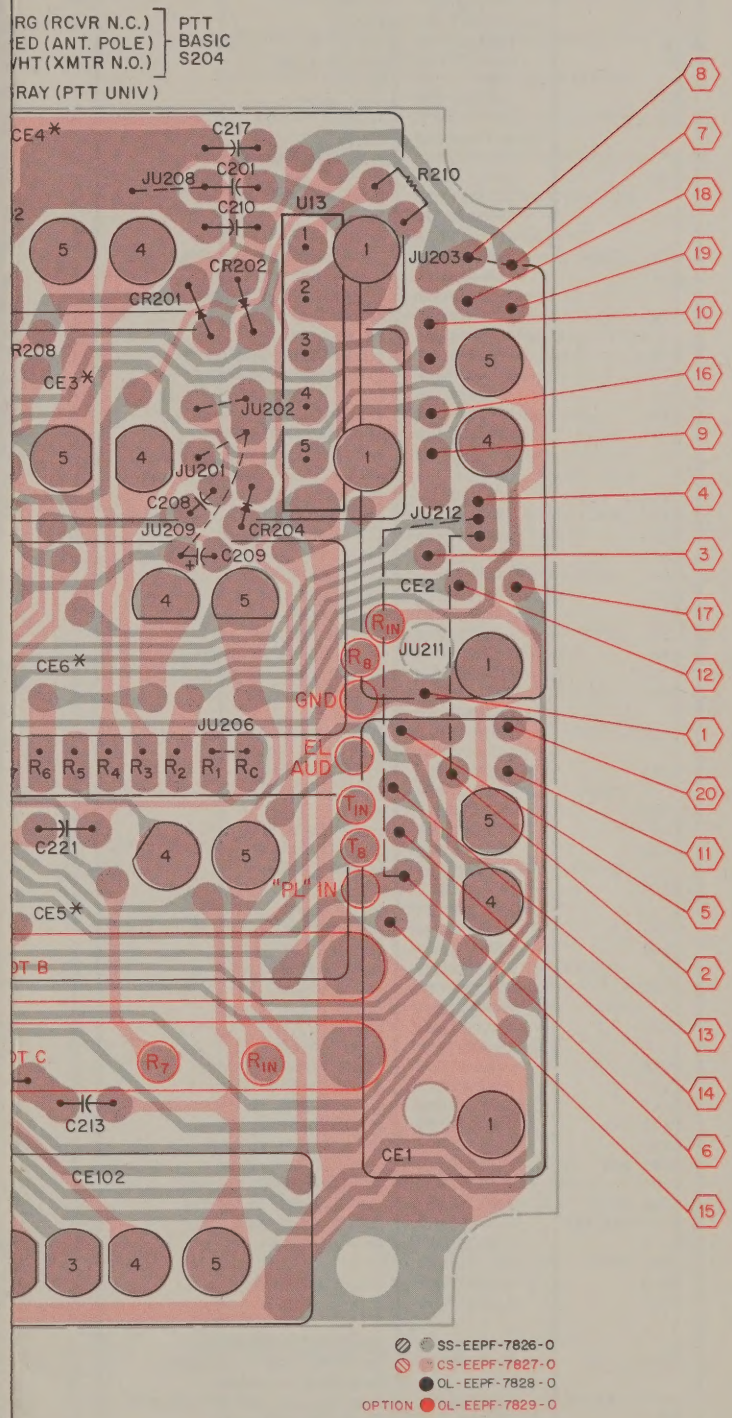
EPF-7847-O

INTERCONNECT BOARD OPTION TIE POINTS

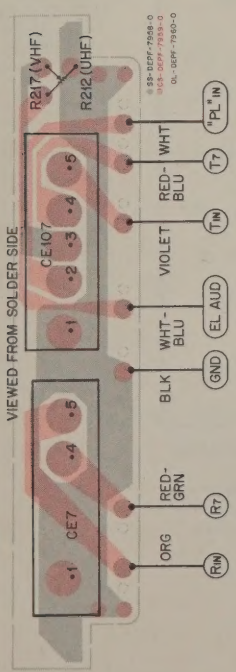
1. GROUND
2. SQUELCH CONTROL VOLTAGE
3. "PL" SWITCH S401-2
4. "PL" SWITCH S401-1
5. DETECTOR OUTPUT
6. TRANSMIT "PL"
7. PTT (UNIVERSAL RADIOS ONLY)
8. RELAY COIL INPUT (UNIVERSAL RADIOS ONLY)
9. +7.5 VDC REGULATED
10. BATTERY B+
11. DETECTOR LIMITER OUTPUT
12. +7.5 VDC REGULATED (RECEIVE ONLY)
13. RECEIVER AUDIO PREAMPLIFIER OUTPUT
14. VOLUME CONTROL, R202-3
15. +7.5 VDC REGULATED (TRANSMIT ONLY)
16. ID TONE INPUT
17. RECEIVER AUDIO POWER AMPLIFIER INPUT
18. (TIE POINT WITH 19)
19. (TIE POINT WITH 18)
20. SPEAKER, J201-2

EPF-7877-O

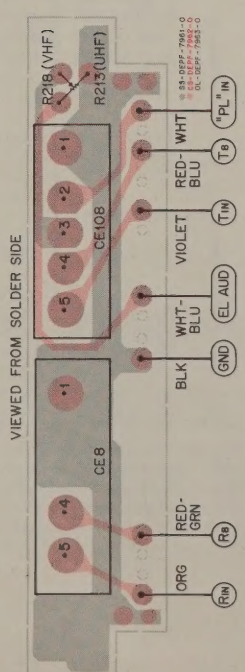
SIDE



C7R7 CHANNEL ELEMENT DECK

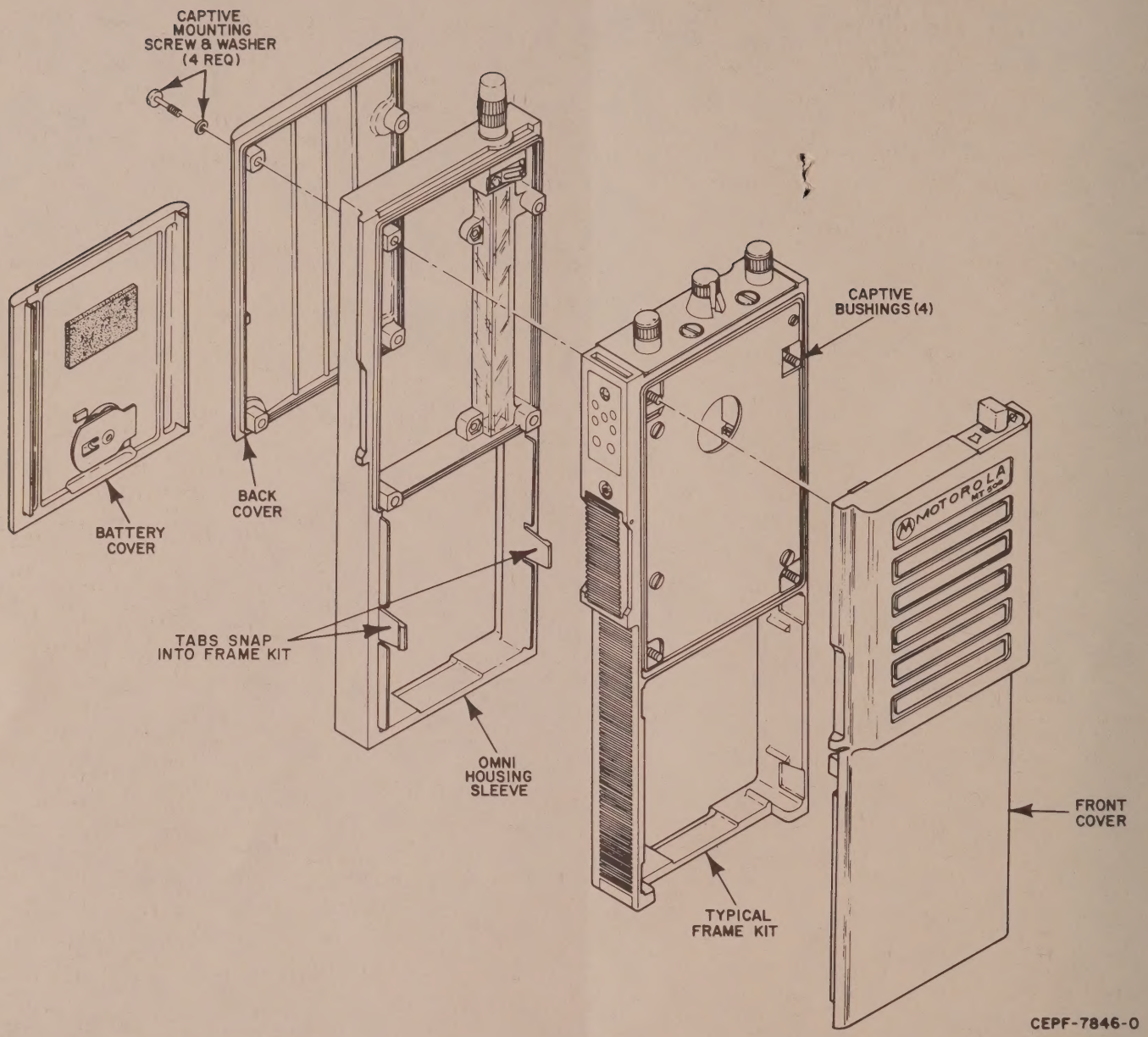


C8 R8 CHANNEL ELEMENT DECK



INTERCONNECT CIRCUIT BOARD DETAIL

DISASSEMBLY PROCEDURE



PROCEDURE

1. TURN THE SLOTTED SCREW HEAD ON THE BATTERY COVER ONE QUARTER TURN COUNTERCLOCKWISE AND REMOVE THE BATTERY COVER.
2. REMOVE THE BATTERY.
3. LOOSEN THE FOUR CAPTIVE SCREWS HOLDING THE BACK COVER AND REMOVE THE BACK COVER.
4. REMOVE SNAP-ON SLEEVE (OMNI-HOUSING ONLY).
5. LOOSEN THE FOUR CAPTIVE BUSHINGS HOLDING THE CHASSIS FRAME TO THE FRONT COVER.
6. SEPARATE THE FRONT COVER FROM THE FRAME.
7. UNPLUG THE WIRES CONNECTING THE FRONT COVER TO THE CHASSIS FRAME.

EPF-7847-O

INTERCONNECT BOARD OPTION TIE POINTS

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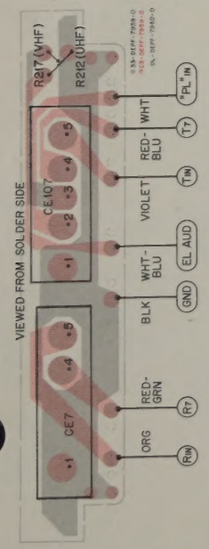
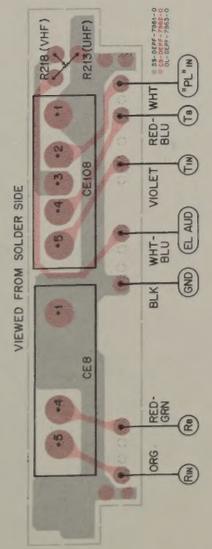
4. "PL" SWITCH S401-1
5. DETECTOR OUTPUT
6. TRANSMIT "PL"
7. PTT (UNIVERSAL RADIOS ONLY)
8. RELAY COIL INPUT (UNIVERSAL RADIOS ONLY)
9. +7.5 VDC REGULATED
10. BATTERY B+
11. DETECTOR LIMITER OUTPUT
12. +7.5 VDC REGULATED (RECEIVE ONLY)
13. RECEIVER AUDIO PREAMPLIFIER OUTPUT
14. VOLUME CONTROL, R202-3
15. +7.5 VDC REGULATED (TRANSMIT ONLY)
16. ID TONE INPUT
17. RECEIVER AUDIO POWER AMPLIFIER INPUT
18. (TIE POINT WITH 19)
19. (TIE POINT WITH 18)
20. SPEAKER, J201-2

EPF-7877-O

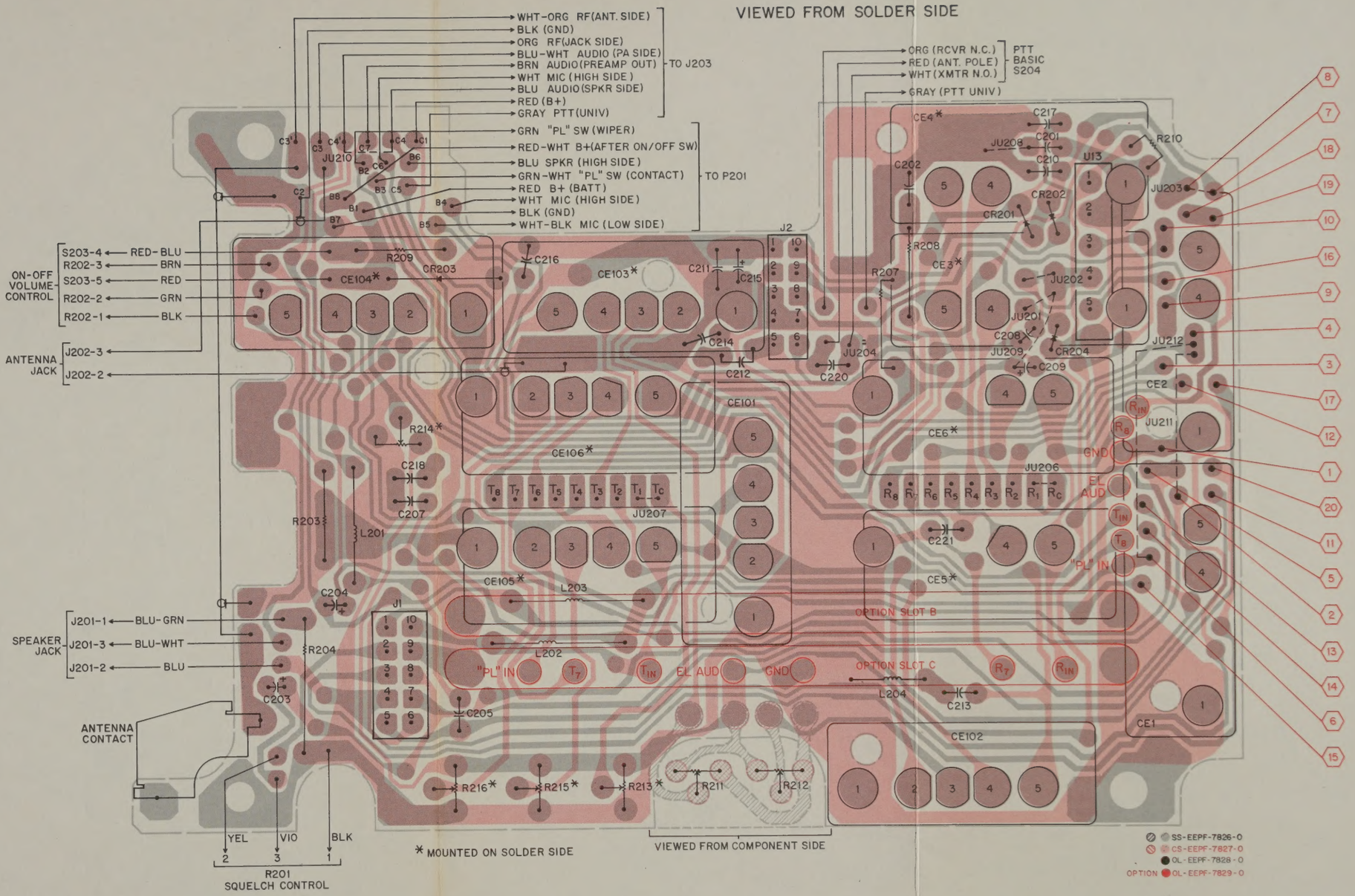
C7R7 CHANNEL ELEMENT DECK



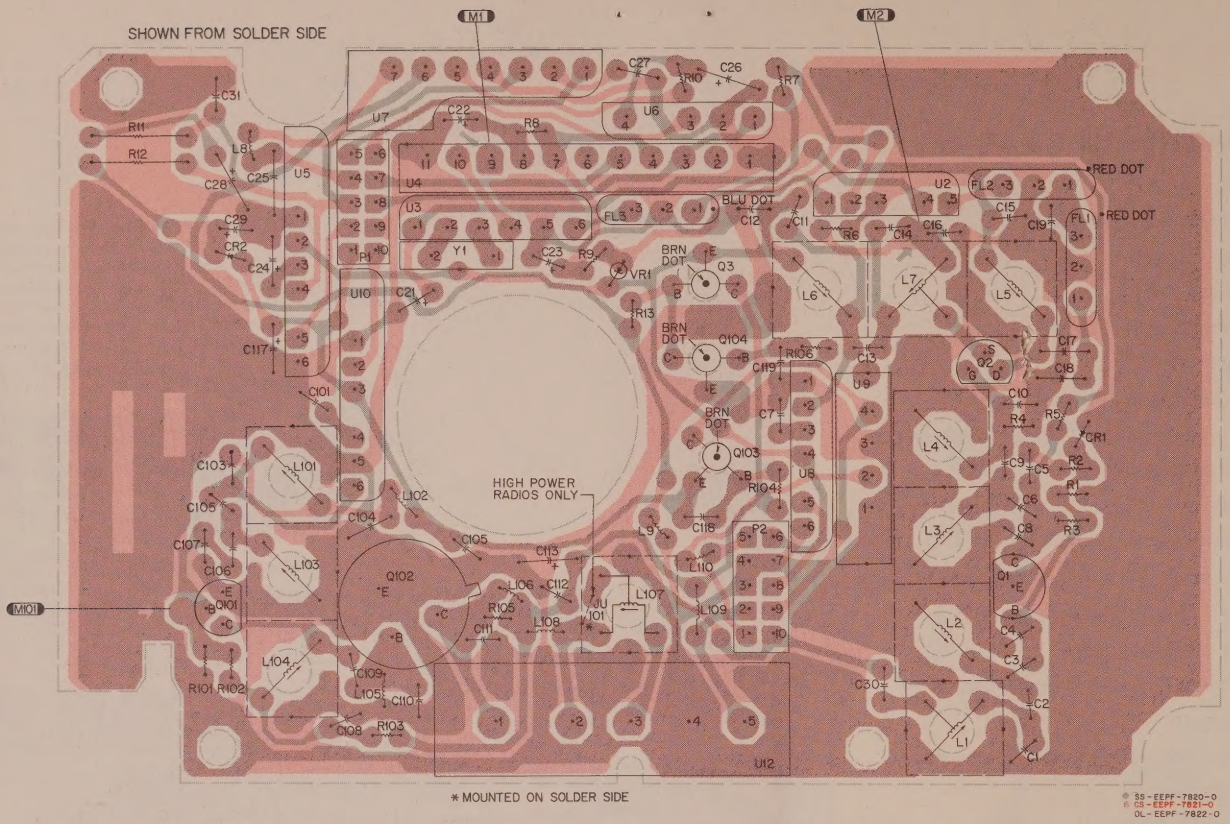
C8 R8 CHANNEL ELEMENT DECK



VIEWED FROM SOLDER SIDE



INTERCONNECT CIRCUIT BOARD DETAIL



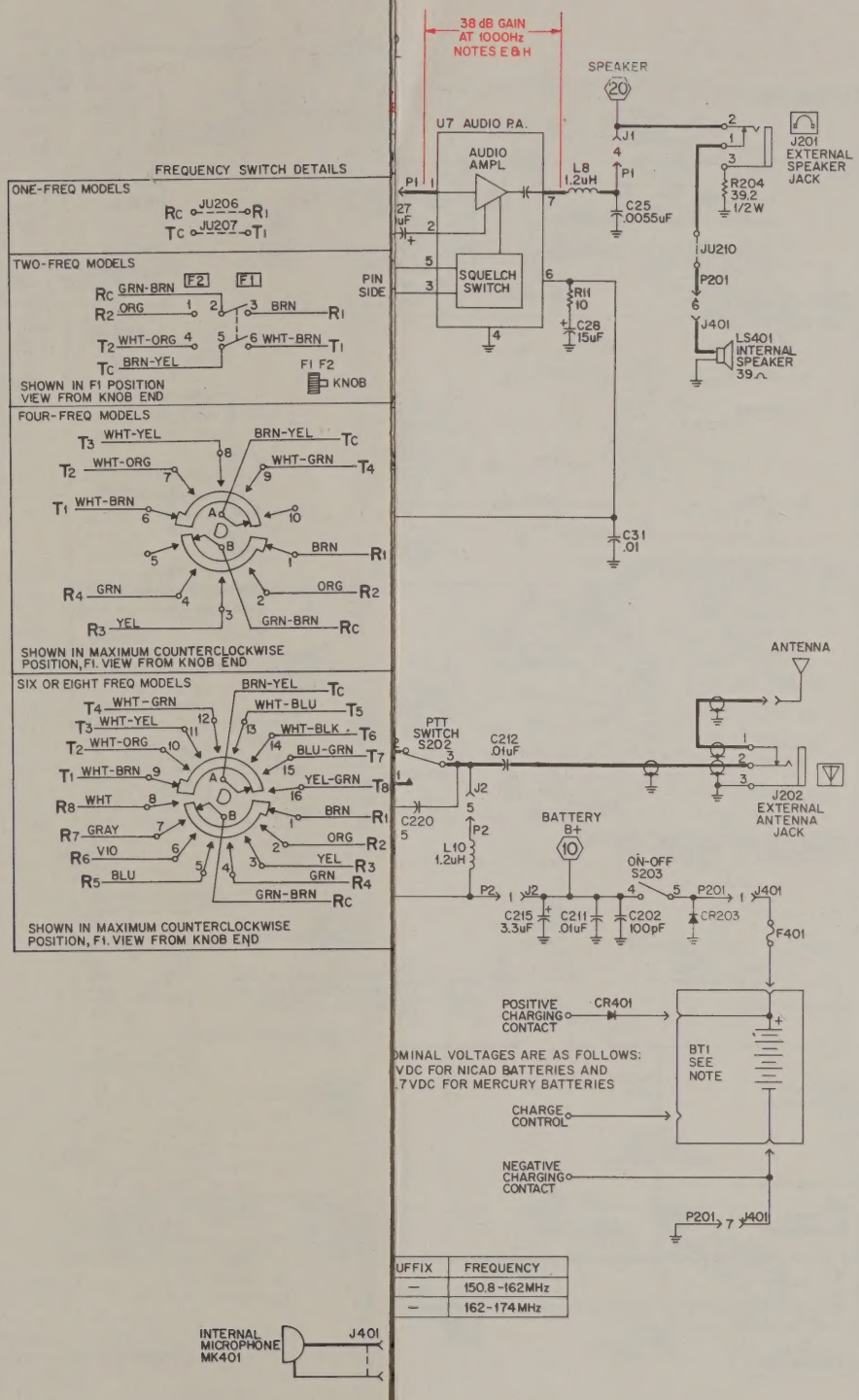
4	0600185A65	4.7 k ±5%
5	0600185A57	2.2 k ±5%
6	0600185A51	1.2 k ±5%
7	0600185B64	56
8	0600185B71	220
9	0600185B68	120
10	0600185B83	2.2 k
11	0600185B55	10
12	0600185C05	120 k
13	0600185B80	1.2 k
101	0600185B83	2.2 k
102	0600185B98	39 k
103	0600185B72	270
104	0600185B77	680
105	0600185B87	4.7 k
106	0600185B82	1.8 k
201	1805333E01	pot., 25 k; squelch control
202	1805370E01	pot., 25 k; volume control, includes S203
203	0600185B64	56
204	1705787D01	39.2 ±1%; 1/2 W
210	0600185B96	27 k
	or 0600185B93	15 k
211 thru 218	1805501C04	pot., 50 k
		SWITCH:
201	4005120E01	Toggle, DPDT (2-freq. models)
	or 4005119E01	Rotary, 5-pos. (4-freq. models)
	or 4005043E01	Rotary, 8-pos. (6- & 8-freq. models)
202	4005265E01	Micro, PTT
203	---	ON-OFF, part of R202
401	4005061E01	Toggle, SPDT, "PL"
		HYBRID, Encapsulated:
2	5184333G07	I-F Amplifier
3	5184333G08	Low Conversion
4	5184333G37	Detector
5	5105177D22	Squelch
6	5105177D02	Audio Pre-Amplifier
7	5105177D05	Audio
8	5105177D13	Receiver Injection
9	5105177D20	Regulator
10	5105177D19	Buffer Tripler

U12	NLD6942A	2 W Power Amplifier; 150.8-162 MHz
	or NLD6943A	2 W Power Amplifier; 162-174 MHz
	or NLD6952A	5 W Power Amplifier; 150.8-162 MHz
	or NLD6953A	5 W Power Amplifier 162-174 MHz
U13	5105177D04	IDC
		DIODE: See Note I
VR1	4882256C61	5.8 V Zener
		CRYSTAL: See Note II
Y1	4805713B01	17.865 MHz
	or 4805713B02	17.935 MHz
	NONREFERENCED ITEMS	
	1483211B01	PAD, Insulator (for Q102)
	1505941D01	COVER, Shield (for U9)
	2605685B01	SHIELD, for U4
	2605820D05	SHIELD, Coil (for L1, L5, L103, & L107)
	2605820D07	SHIELD, Coil (for L2, L3, L4, L6, L7, L101, & L104)
	2683379H01	HEATSINK, for Q102
	3905243F01	CONTACT, Ground (for U12)
	7505176E01	PAD, Foam (for channel elements)
	7505295B03	PAD, Insulator (for FL1, FL2, FL3, & Y1)
	0105959C10	CIRCUIT BOARD (for R11 & R12)
	1505894D01	COVER, Shield (for U13)
	7505506D02	MODULE PAD (for U4)
	7505506D03	MODULE PAD (for U3)
	7505506D04	MODULE PAD (for U2)
	7505506D06	MODULE PAD (for U6 & U13)
	7505506D07	MODULE PAD (for U7)
	7505506D08	MODULE PAD (for U8 & U10)

NOTES: I. For optimum performance, order replacement diodes and transistors by Motorola part number only.

II. When ordering crystal units, specify crystal frequency and Motorola part number. Gold faced FL1, FL2, and FL3 crystal filters cannot be mixed with silver can FL1, FL2, and FL3 crystal filters.

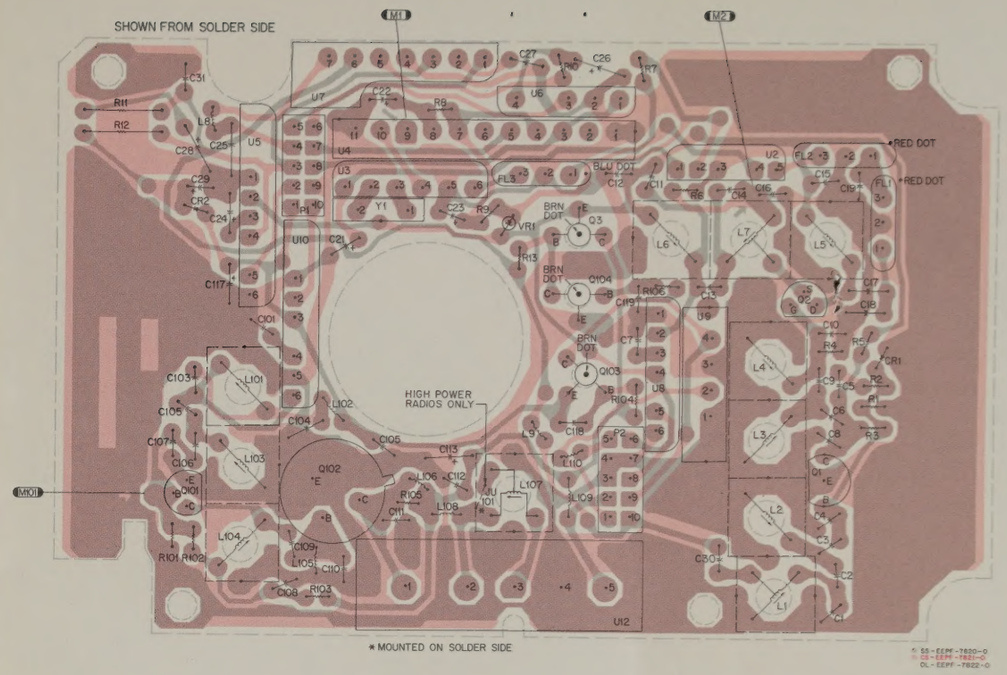
BASIC CIRCUIT BOARD DETAIL AND PARTS LIST



BASIC SCHEMATIC DIAGRAM

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, Fixed: pF ±5%; 25 V; N150 unless stated
C1	2105311E17	11 (M)
	or 2105311E12	9; 100 V (H)
C2	2182450B26	0.30 ±10%; 500 V
C3	2105311E16	18 (M)
	or 2105311E02	15 (H)
C4	2105311E07	36 (M)
	or 2105311E06	30 (H)
C5	2182358G94	100 ±10%; 75 V; N2200
C6	2105311E14	20; 100 V (M)
	or 2105311E16	18 (H)
C7	2105311E20	6 (M only)
C8	2105311E07	36 (M)
	or 2105311E06	30 (H)
C9	2182450B26	0.30 ±10%; 500 V
C10	2105311E12	9; 100 V (M)
	or 2105311E18	7 (H)
C11	2105311E02	15 (M)
	or 2105311E08	13 (H)
C12	2184008H13	.05 uF ±20%; 50 V; Y5R
C13	2182450B24	0.47 ±10%; 500 V (M)
	or 2182450B21	0.39 ±10%; 500 V (H)
C14	2105311E16	18 (M)
	or 2105311E02	15 (H)
C15	2184008H13	.05 uF ±20%; 50 V; Y5R
C16	2184008H24	.01 uF ±10%; 50 V; Y5F
C17	2182358G18	125
C18	2182358G30	150; N220
C19	2182358G24	12 ±3%; 100 V; NPO
	or 2105311E12	9; 100 V (Use only when FL1, FL2, FL3 are 4805393F' series)
C21, 22	2305612E03	33 uF ±20%; 4 V
C23	2305612E01	22 uF ±20%; 2 V
C24	2382397D28	3.3 uF ±20%; 20 V
C25	2182213E03	.0055 uF -0+100%; 75 V
C26	2382397D16	22 uF ±20%; 15 V
C27	2305612E06	10 uF ±20%; 15 V
C28	2382397D17	15 uF ±20%; 20 V
C29	2382397D36	1 uF ±10%; 20 V
C30	2182358G94	100 ±10%; 75 V; N2200
C31	2184008H24	.01 uF ±10%; 50 V; Y5F
C101	2105311E03	47 (M)
	or 2105311E07	36 (H)
C102	2182450B22	0.75 ±10%; 500 V (M)
	or 2182450B40	0.56 ±10%; 500 V (H)
C103	2105311E04	10 (M)
	or 2100867807	8 (H)
C104	2105311E05	65
C105	2182213E08	1000; 100 V; Y5D
C106	2105311E02	15 (M)
	or 2105311E08	13 (H)
C107	2182877B51	50; 50 V (M)
	or 2182358G27	43; 50 V (H)
C108	2182358G94	100 ±10%; 75 V; N2200
C109	2105311E02	15 (M)
	or 2182358G24	12 ±3%; 100 V; NPO (H)
C110	2182358G27	43; 50 V (M)
	or 2105311E06	30 (H)
C111	2105311E04	10 (M)
	or 2100867807	8 (H)
C112	2182213E06	4700 -0+100%; 75 V
C113	2382397D15	10 uF ±20%; 20 V
C117	2382397D09	6.8 uF ±20%; 10 V
C118, 119	2182358G94	100 ±10%; 75 V; N2200
C202	2182358G94	100 ±10%; 75 V; N2200
C203, 204	2382397D12	0.12 uF ±10%; 20 V
C205	2184008H24	.01 uF ±10%; 50 V; Y5F
C206, 207	2184008H24	.01 uF ±10%; 50 V; Y5F
C211, 212, 221	2184008H24	.01 uF ±10%; 50 V; Y5F
C213	2182358G24	12 ±3%; 100 V; NPO
C214	2105311E12	9
C215	2382397D28	3.3 uF ±20%; 20 V
C220	2182877B17	5
		CHANNEL ELEMENT:
CE1 thru 8	KXN1034A	Receiver, use as required depending on model
CE101 thru 108	KXN1042A	Transmitter, use as required depending on model
		DIODE: See Note I
CR1	4882363E03	Silicon
CR2	4883654H01	Silicon
CR203	4882466H13	Silicon
CR401	4882466H13	Silicon
		FERRITE BEAD:
E101	7683960B05	For L108

F401	6505214E01	FUSE: 2-Amp
FL1, 2	4805915D01	FILTER: See Note II Crystal, 4-pole; (gold faced), Matched pair coded RED
	or 4805269F01	Crystal, 4-pole; (silver can), Matched pair coded RED
	or 4805393F01	Crystal, 4-pole; (silver can), Matched pair coded RED
FL3	4805915D02	Crystal, 2-pole; (gold faced), coded BLU
	or 4805269F02	Crystal, 2-pole; (silver can), coded BLU
	or 4805393F02	Crystal 2-pole; (silver can), coded BLU
FL1, FL2, & FL3 package	4805915D03	Crystal, 6-pole; (gold faced), Matched set
	or 4805269F03	Crystal, 6-pole; (silver can), Matched set
	or 4805393F03	Crystal, 6-pole; (silver can), Matched set
J1, 2	0105959C40	JACK: ASSEMBLY, Socket; 10-pin
J201	0905283B01	Micro, speaker
J202	0905283B01	Micro, antenna
J401	0105958C87	Receptacle, Conn Assy CS Long
	or 0105956C63	Receptacle, Conn Assy CS Short
	or 0105957C86	Receptacle, Conn Assy PL Long
	or 0105958C95	Receptacle, Conn Assy PL Short
L1	2405262E11	COIL, RF: unless stated Coded: GRN, 5-1/2 turns spadewound tapped at 4-3/4 turns; includes: 7605374B03 CORE
L2, 3, 4	2405262E08	Coded: YEL, 4-1/2 turns spacewound; includes: 7605374B03 CORE
L5	2405262E06	Coded: BLK, 22-1/2 turns closewound; includes 7605374B02 CORE
L6	2405262E08	Coded: YEL, 4-1/2 turns spacewound; includes: 7605374B03 CORE
L7	2405262E05	Coded: BLUE, 4-1/2 turns spacewound tapped at 3-1/4 turns; includes: 7605374B03 CORE
L8, 9	2482723H27	1.2 uH choke
L101	2405262E08	Coded: YEL, 4-1/2 turns spacewound; includes: 7605374B03 CORE
L102	2482723H06	6.2 uH choke
L103, 104	2405262E08	Coded: YEL, 4-1/2 turns spacewound; includes: 7605374B03 CORE
L105	2405711B02	3-turn bead
L106	2482723H11	0.2 uH choke
L107	2405262E07	Coded: ORG, 4-3/4 turns spacewound tapped at 1-1/4 turns; includes: 7605374B03 CORE
L108	2482723H11	0.2 uH choke
L109, 110	2482723H27	1.2 uH choke
L201	2482723H27	1.2 uH choke
L202, 203	2482723H06	6.2 uH choke
L204	2505350F01	0.085 uH choke
LS401	5005334D01	SPEAKER: Dynamic, 2"; frequency response: 300 to 3500 Hz
MK401	5982575J02	MICROPHONE: Cartridge, res: 700 Ω ±20%; Imp: 5000 Ω ±30%
P1, 2	0105958C97	PLUG: ASSEMBLY, 10-pin
P201	0105959C38	ASSEMBLY, Cable
Q1	4800869819	TRANSISTOR: See Note I NPN; type M9819
Q2	4800869726	N-Channel FET
Q3	4800869899	NPN; type M9899
Q101	4800869494	NPN; type M9494
Q102	4800869906	NPN; type M9906
Q103, 104	4800869899	NPN; type M9899
R1	0600185A69	RESISTOR, Fixed: Ω ±10%; 1/8 W unless stated 6.8 k ±5%
R2	0600185A55	1.8 k ±5%
R3	0600185A85	33 k ±5%

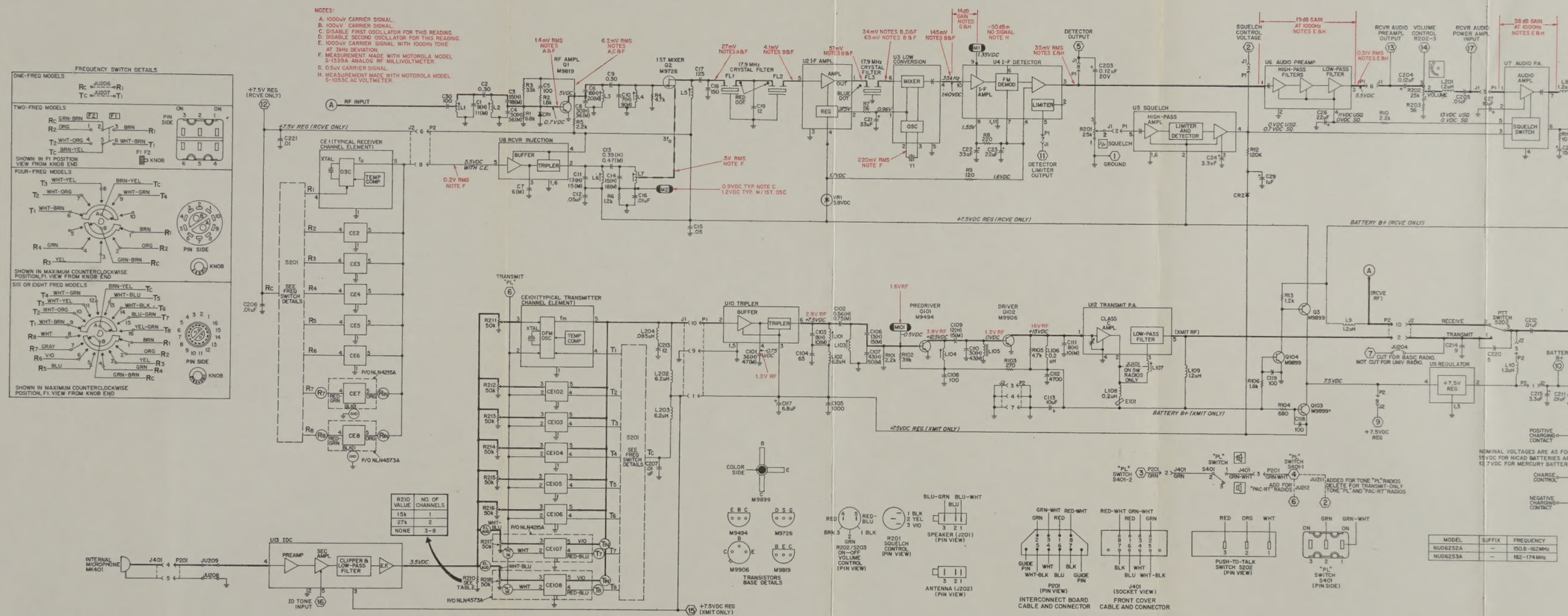


R4	0600185A65	4.7 k ±5%
R5	0600185A57	2.2 k ±5%
R6	0600185A51	1.2 k ±5%
R7	0600185B64	56
R8	0600185B71	220
R9	0600185B68	120
R10	0600185B83	2.2 k
R11	0600185B55	10
R12	0600185C05	120 k
R13	0600185B80	1.2 k
R101	0600185B83	2.2 k
R102	0600185B98	39 k
R103	0600185B72	270
R104	0600185B77	680
R105	0600185B87	4.7 k
R106	0600185B82	1.8 k
R201	1805333E01	pot., 25 k; squelch control
R202	1805370E01	pot., 25 k; volume control, includes S203
R203	0600185B64	56
R204	1705787D01	39.2 ±1%; 1/2 W
R210	0600185B96	27 k
	or 0600185B93	15 k
R211 thru 218	1805501C04	pot., 50 k
		SWITCH:
S201	4005120E01	Toggle, DPDT (2-freq. models)
	or 4005119E01	Rotary, 5-pos. (4-freq. models)
	or 4005043E01	Rotary, 8-pos. (6- & 8-freq. models)
S202	4005265E01	Micro, PTT
S203	---	ON-OFF, part of R202
S401	4005061E01	Toggle, SPDT, "PL"
		HYBRID, Encapsulated:
U2	5184333G07	I-F Amplifier
U3	5184333G08	Low Conversion
U4	5184333G37	Detector
U5	5105177D22	Squelch
U6	5105177D02	Audio Pre-Amplifier
U7	5105177D05	Audio
U8	5105177D13	Receiver Injection
U9	5105177D20	Regulator
U10	5105177D19	Buffer Tripler

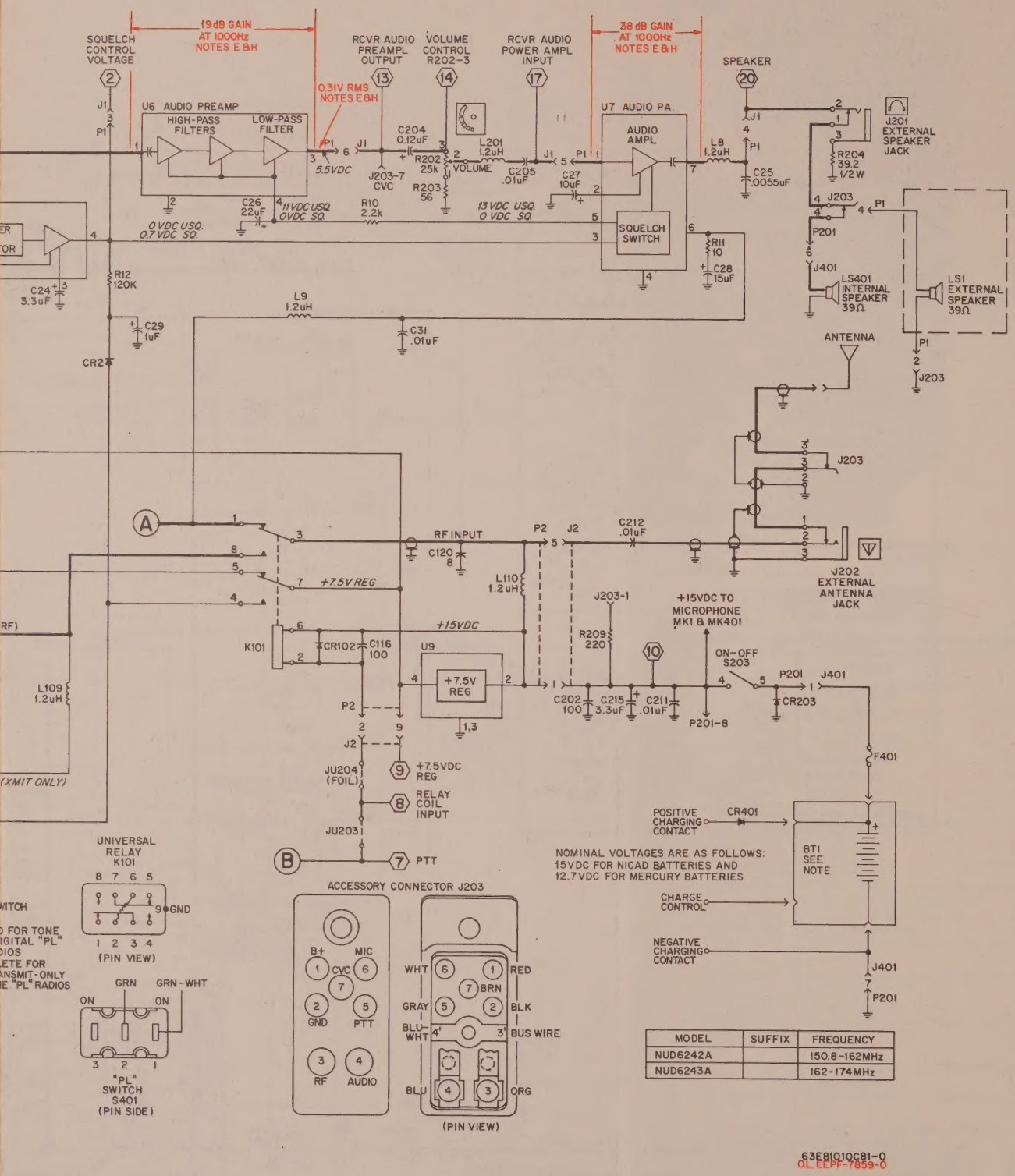
U12	NLD6942A	2 W Power Amplifier; 150.8-162 MHz
	or NLD6943A	2 W Power Amplifier; 162-174 MHz
	or NLD6952A	5 W Power Amplifier; 150.8-162 MHz
	or NLD6953A	5 W Power Amplifier 162-174 MHz
U13	5105177D04	IDC
		DIODE: See Note I
VR1	4882256C61	5.8 V Zener
		CRYSTAL: See Note II
Y1	4805713B01	17.865 MHz
	or 4805713B02	17.935 MHz
NONREFERENCED ITEMS		
	1483211B01	PAD, Insulator (for Q102)
	1505941D01	COVER, Shield (for U9)
	2605685B01	SHIELD, for U4
	2605820D05	SHIELD, Coil (for L1, L5, L103, & L107)
	2605820D07	SHIELD, Coil (for L2, L3, L4, L6, L7, L101, & L104)
	2683379H01	HEATSINK, for Q102
	3905243F01	CONTACT, Ground (for U12)
	7505176E01	PAD, Foam (for channel elements)
	7505295B03	PAD, Insulator (for FL1, FL2, FL3, & Y1)
	0105959C10	CIRCUIT BOARD (for R11 & R12)
	1505894D01	COVER, Shield (for U13)
	7505506D02	MODULE PAD (for U4)
	7505506D03	MODULE PAD (for U3)
	7505506D04	MODULE PAD (for U2)
	7505506D06	MODULE PAD (for U6 & U13)
	7505506D07	MODULE PAD (for U7)
	7505506D08	MODULE PAD (for U8 & U10)

NOTES: I. For optimum performance, order replacement diodes and transistors by Motorola part number only.
II. When ordering crystal units, specify crystal frequency and Motorola part number. Gold faced FL1, FL2, and FL3 crystal filters cannot be mixed with silver can FL1, FL2, and FL3 crystal filters.

BASIC CIRCUIT BOARD DETAIL AND PARTS LIST



BASIC SCHEMATIC DIAGRAM



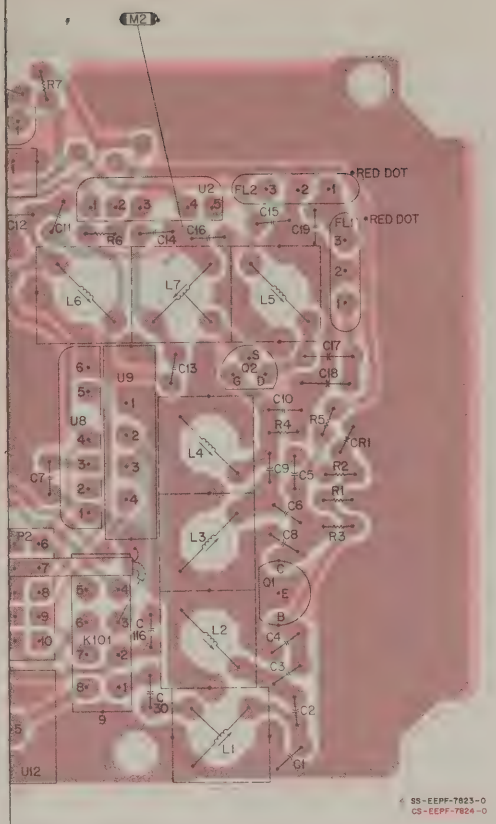
MODEL	SUFFIX	FREQUENCY
NUD6242A		150.8-162MHz
NUD6243A		162-174MHz

UNIVERSAL SCHEMATIC DIAGRAM

Electrical Parts List
150.8-162 MHz (M)
162-174 MHz (H)

PLF-1264-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, Fixed: pF ±5%; 25 V; N150 unless stated
C1	2105311E17	11 (M)
	or 2105311E12	9; 100 V (H)
C2	2182450B26	0.30 ±10%; 500 V
C3	2105311E16	18 (M)
	or 2105311E02	15 (H)
C4	2105311E07	36 (M)
	or 2105311E06	30 (H)
C5	2182358G94	100 ±10%; 75 V; N2200
C6	2105311E14	20; 100 V (M)
	or 2105311E16	18 (H)
C7	2105311E20	6 (M only)
C8	2105311E07	36 (M)
	or 2105311E06	30 (H)
C9	2182450B26	0.30 ±10%; 500 V
C10	2105311E12	9; 100 V (M)
	or 2105311E18	7 (H)
C11	2105311E02	15 (M)
	or 2105311E08	13 (H)
C12	2184008H13	.05 uF ±20%; 50 V; Y5R
C13	2182450B21	0.39 ±10%; 500 V
C14	2105311E16	18 (M)
	or 2105311E02	15 (H)
C15	2184008H13	.05 uF ±20%; 50 V; Y5R
C16	2184008H24	.01 uF ±10%; 50 V; Y5F
C17	2182358G18	125
C18	2182358G30	150; N220
C19	2182358G24	12 ±3%; 100 V; NPO
	or 2105311E12	9; 100 V (use only when FL1, FL2, FL3 are 4805393F' series)
C21, 22	2305612E03	33 uF ±20%; 4 V
C23	2305612E01	22 uF ±20%; 2 V
C24	2382397D28	3.3 uF ±20%; 20 V
C25	2182213E03	.0055 uF -0+100%; 75 V
C26	2382397D16	22 uF ±20%; 15 V
C27	2305612E06	10 uF ±20%; 15 V
C28	2382397D17	15 uF ±20%; 20 V
C29	2382397D36	1 uF ±10%; 20 V
C30	2182358G94	100 ±10%; 75 V; N2200
C31	2184008H24	.01 uF ±10%; 50 V; Y5F
C101	2105311E03	47 (M)
	or 2105311E07	36 (H)
C102	2182450B22	0.75 ±10%; 500 V (M)
	or 2182450B40	0.56 ±10%; 500 V (H)
C103	2105311E04	10 (M)
	or 2100867807	8 (H)
C104	2105311E05	65
C105	2182213E08	1000; 100 V; Y5D
C106	2105311E02	15 (M)
	or 2105311E08	13 (H)
C107	2182877B51	50; 50 V (M)
	or 2182358G27	43; 50 V (H)
C108	2182358G94	100 ±10%; 75 V; N2200
C109	2105311E02	15 (M)
	or 2182358G24	12 ±3%; 100 V; NPO (H)
C110	2182358G27	43; 50 V (M)
	or 2105311E06	30 (H)
C111	2105311E04	10 (M)
	or 2100867807	8 (H)
C112	2182213E06	4700 -0+100%; 75 V
C113	2382397D15	10 uF ±20%; 20 V
C116	2182358G94	100 ±10%; 75 V; N2200
C117	2382397D09	6.8 uF ±20%; 10 V
C120	2100867807	8
C201, 217	2182213E29	100
C202	2182358G94	100 ±10%; 75 V; N2200
C203, 204	2382397D12	0.12 uF ±10%; 20 V
C205	2184008H24	.01 uF ±10%; 50 V; Y5F
C206, 207	2184008H24	.01 uF ±10%; 50 V; Y5F
C208, 209	2182397D25	0.27 uF ±10%
C210	2182358G94	100 ±10%; 75 V; N2200
C211, 212, 221	2184008H24	.01 uF ±10%; 50 V; Y5F
C213	2182358G24	12 ±5%
C215	2382397D28	3.3 uF ±20%; 20 V
C216	2182358G94	100 ±10%; 75 V; N2200
C220	2182877B17	5
		CHANNEL ELEMENT:
CE1 thru 8	KXN1034A	Receiver, use as required depending on model
CE101 thru 108	KXN1042A	Transmitter, use as required depending on model
		DIODE: See Note I
CR1	4882363E03	Silicon
CR2	4883654H01	Silicon
CR102	4882363E03	Silicon
CR201, 202	4882363E04	Silicon
CR203	4882466H13	Silicon
CR204	4883461E12	Silicon
CR401	4882466H13	Silicon

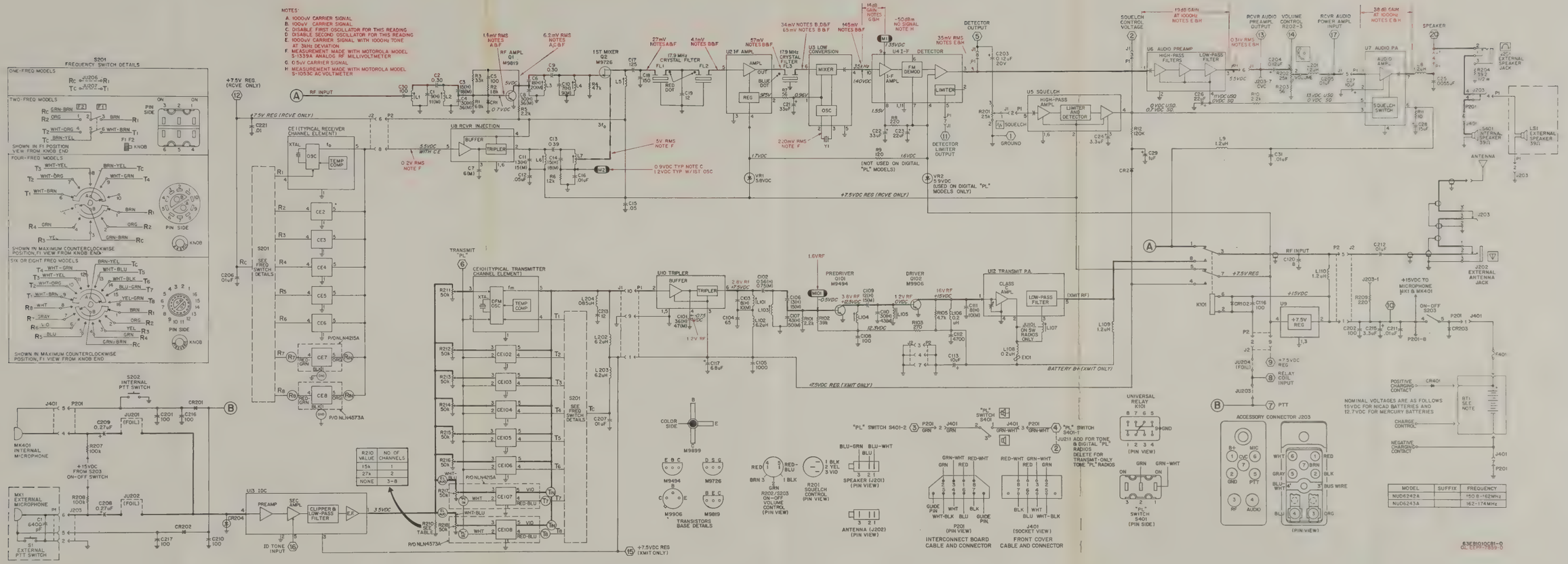


5105177D20	Regulator
5105177D19	Buffer Tripler
NLD6942A	2 W Power Amplifier 150.8-162 MHz
or NLD6943A	2 W Power Amplifier 162-174 MHz
or NLD6952A	5 W Power Amplifier 150.8-162 MHz
or NLD6953A	5 W Power Amplifier 162-174 MHz
5105177D04	IDC
	DIODE: See Note I
4882256C61	5.8 V Zener
	CRYSTAL: See Note II
4805713B01	17.865 MHz
or 4805713B02	17.935 MHz

NONREFERENCED ITEMS	
1405601C01	PAD, Insulator (for K101)
1483211B01	PAD, Insulator (for Q102)
1505941D01	COVER, Shield (for U9)
2605685B01	SHIELD, for U4
2605820D05	SHIELD, Coil (for L1, L5, L103, & L107)
2605820D07	SHIELD, Coil (for L2, L3, L4, L6, L7, L101 & L104)
2683379H01	HEATSINK, for Q102
3905243F01	CONTACT, Ground (for U12)
7505176E01	PAD, Foam (for channel elements)
7505295B03	PAD, Insulator (for FL1, FL2, FL3, & Y1)
0105959C10	CIRCUIT BOARD (for R11 & R12)
1505894D01	COVER, Shield (for U13)
7505506D02	MODULE PAD (for U4)
7505506D03	MODULE PAD (for U3)
7505506D06	MODULE PAD (for U6 & U13)
7505506D07	MODULE PAD (for U7)
7505506D08	MODULE PAD (for U8 & U10)
7505506D09	MODULE PAD (for U9)

or optimum performance, order replacement diodes
d transistors by Motorola part number only.
hen ordering crystal units, specify crystal frequency
d Motorola part number. Gold faced FL1, FL2, and
L3 crystal filters cannot be mixed with silver can
L1, FL2, and FL3 crystal filters.

UNIVERSAL CIRCUIT BOARD DETAIL AND PARTS LIST



SCHEMATIC NOTES

1. UNLESS OTHERWISE STATED, RESISTANCES ARE IN OHMS AND CAPACITANCES ARE IN PICOFARADS.
2. DC VOLTAGES ARE MEASURED FROM POINT INDICATED TO CHASSIS GROUND USING MOTOROLA DC MULTIMETER OR EQUIVALENT.
3. ⓘ INDICATES CONNECTION POINT TO INTERCONNECT CIRCUIT BOARD.
4. REFERENCE DESIGNATIONS ARE ASSIGNED IN THE FOLLOWING MANNER

UNIT SERIES	-	RECEIVER
100 SERIES	-	TRANSMITTER
200 SERIES	-	INTERCONNECT BOARD
400 SERIES	-	FRONT COVER

EPF-7876-O

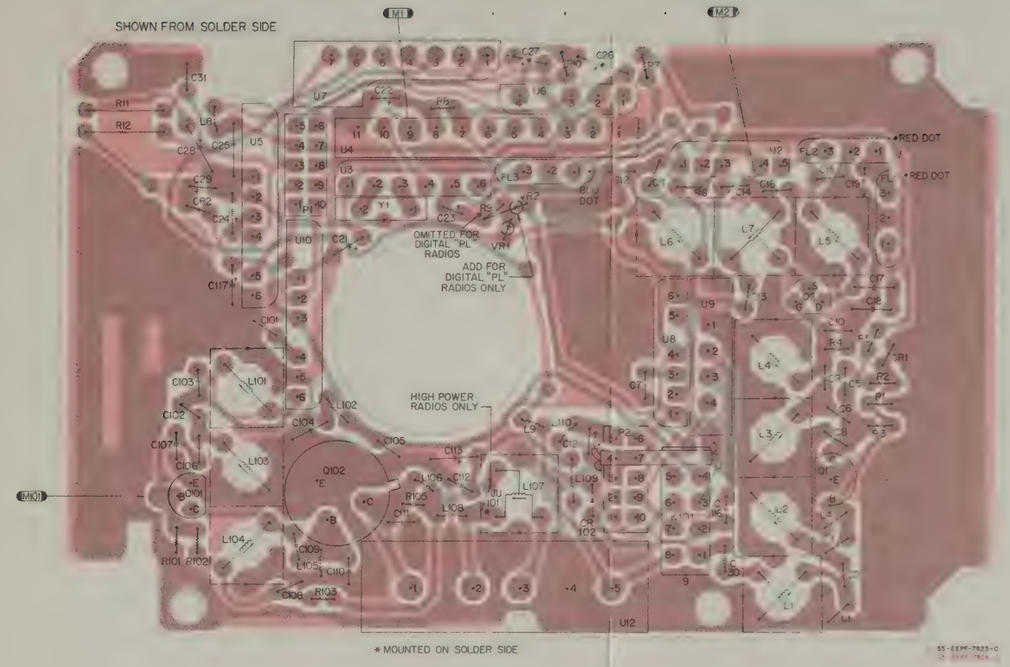
UNIVERSAL SCHEMATIC DIAGRAM

Electrical Parts List
150.8-162 MHz (M)
162-174 MHz (H)

PLF-1264-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, Fixed: pF ±5%; 25 V; N150 unless stated
C1	2105311E17	11 (M)
	or 2105311E12	9; 100 V (H)
C2	2182450B26	0.30 ±10%; 500 V
C3	2105311E16	18 (M)
	or 2105311E02	15 (H)
C4	2105311E07	36 (M)
	or 2105311E06	30 (H)
C5	2182358G94	100 ±10%; 75 V; N2200
C6	2105311E14	20; 100 V (M)
	or 2105311E16	18 (H)
C7	2105311E20	6 (M only)
C8	2105311E07	36 (M)
	or 2105311E06	30 (H)
C9	2182450B26	0.30 ±10%; 500 V
C10	2105311E12	9; 100 V (M)
	or 2105311E18	7 (H)
C11	2105311E02	15 (M)
	or 2105311E08	13 (H)
C12	2184008H13	.05 uF ±20%; 50 V; Y5R
C13	2182450B21	0.39 ±10%; 500 V
C14	2105311E16	18 (M)
	or 2105311E02	15 (H)
C15	2184008H13	.05 uF ±20%; 50 V; Y5R
C16	2184008H24	.01 uF ±10%; 50 V; Y5F
C17	2182358G18	125
C18	2182358G30	150; N220
C19	2182358G24	12 ±3%; 100 V; NPO
	or 2105311E12	9; 100 V (use only when FL1, FL2, FL3 are 4805393F' series)
C21, 22	2305612E03	33 uF ±20%; 4 V
C23	2305612E01	22 uF ±20%; 2 V
C24	2382397D28	3.3 uF ±20%; 20 V
C25	2182213E03	.0055 uF -0+100%; 75 V
C26	2382397D16	22 uF ±20%; 15 V
C27	2305612E06	10 uF ±20%; 15 V
C28	2382397D17	15 uF ±20%; 20 V
C29	2382397D36	1 uF ±10%; 20 V
C30	2182358G94	100 ±10%; 75 V; N2200
C31	2184008H24	.01 uF ±10%; 50 V; Y5F
C101	2105311E03	47 (M)
	or 2105311E07	36 (H)
C102	2182450B22	0.75 ±10%; 500 V (M)
	or 2182450B40	0.56 ±10%; 500 V (H)
C103	2105311E04	10 (M)
	or 2100867807	8 (H)
C104	2105311E05	65
C105	2182213E08	1000; 100 V; Y5D
C106	2105311E02	15 (M)
	or 2105311E08	13 (H)
C107	2182877B51	50; 50 V (M)
	or 2182358G27	43; 50 V (H)
C108	2182358G94	100 ±10%; 75 V; N2200
C109	2105311E02	15 (M)
	or 2182358G24	12 ±3%; 100 V; NPO (H)
C110	2182358G27	43; 50 V (M)
	or 2105311E06	30 (H)
C111	2105311E04	10 (M)
	or 2100867807	8 (H)
C112	2182213E06	4700 -0+100%; 75 V
C113	2382397D15	10 uF ±20%; 20 V
C116	2182358C94	100 ±10%; 75 V; N2200
C117	2382397D09	6.8 uF ±20%; 10 V
C120	2100867807	8
C201, 217	2182213E29	100
C202	2182358G94	100 ±10%; 75 V; N2200
C203, 204	2382397D12	0.12 uF ±10%; 20 V
C205	2184008H24	.01 uF ±10%; 50 V; Y5F
C206, 207	2184008H24	.01 uF ±10%; 50 V; Y5F
C208, 209	2182397D25	0.27 uF ±10%
C210	2182358G94	100 ±10%; 75 V; N2200
C211, 212, 221	2184008H24	.01 uF ±10%; 50 V; Y5F
C213	2182358G24	12 ±5%
C215	2382397D28	3.3 uF ±20%; 20 V
C216	2182358G94	100 ±10%; 75 V; N2200
C220	2182877B17	5
		CHANNEL ELEMENT:
CE1 thru 8	KXN1034A	Receiver, use as required depending on model
CE101 thru 108	KXN1042A	Transmitter, use as required depending on model
		DIODE: See Note I
CR1	4882363E03	Silicon
CR2	4883654H01	Silicon
CR102	4882363E03	Silicon
CR201, 202	4882363E04	Silicon
CR203	4882466H13	Silicon
CR204	4883461E12	Silicon
CR401	4882466H13	Silicon

E101	7683960B05	FERRITE BEAD: For L108
F401	6505214E01	FUSE: 2-Amp
		FILTER: See Note II
FL1, 2	4805915D01	Crystal, 4-pole; (gold faced), Matched pair coded RED
	or 4805269F01	Crystal, 4-pole; (silver can), Matched pair coded RED
	or 4805393F01	Crystal, 4-pole; (silver can), Matched pair coded RED
FL3	4805915D02	Crystal, 2-pole; (gold faced), coded BLU
	or 4805269F02	Crystal, 2-pole; (silver can), coded BLU
	or 4805393F02	Crystal, 2-pole; (silver can), coded BLU
FL1, FL2, & FL3 package	4805915D03	Crystal, 6-pole; (gold faced), Matched set
	or 4805269F03	Crystal, 6-pole; (silver can), Matched set
	or 4805393F03	Crystal, 6-pole; (silver can), Matched set
		JACK:
J1, 2	0105959C40	ASSEMBLY, Socket; 10-pin
J201	0905283B01	Micro, speaker
J202	0905283B01	Micro, antenna
J203	0905677D01	Receptacle, Univ. Connector
J401	0105958C87	Receptacle, Conn Assy CS Long
	or 0105956C63	Receptacle, Conn Assy CS Short
	or 0105957C86	Receptacle, Conn Assy PL Long
	or 0105958C95	Receptacle, Conn Assy PL Short
		RELAY:
K101	8005300E01	1/6th Crystal Can, DPDT
		COIL, RF: unless stated
L1	2405262E11	Coded: GRN, 5-1/2 turns spacewound tapped at 4-3/4 turns; includes: 7605374B03 CORE
L2, 3, 4	2405262E08	Coded: YEL, 4-1/2 turns spacewound; includes: 7605374B03 CORE
L5	2405262E06	Coded: BLK, 22-1/2 turns closewound; includes: 7605374B02 CORE
L6	2405262E08	Coded: YEL, 4-1/2 turns spacewound; includes: 7605374B03 CORE
L7	2405262E05	Coded: BLUE, 4-1/2 turns spacewound tapped at 3-1/4 turns; includes: 7605374B03 CORE
L8, 9	2482723H27	1.2 uH choke
L101	2405262E08	Coded: YEL, 4-1/2 turns spacewound; includes: 7605374B03 CORE
L102	2482723H06	6.2 uH choke
L103, 104	2405262E08	Coded: YEL, 4-1/2 turns spacewound; includes: 7605374B03 CORE
L105	2405711B02	3-turn bead
L106	2482723H11	0.2 uH choke
L107	2405262E07	Coded: ORG, 4-3/4 turns spacewound tapped at 1-1/4 turns; includes: 7605374B03 CORE
L108	2482723H11	0.2 uH choke
L109, 110	2482723H27	1.2 uH choke
L201	2482723H27	1.2 uH choke
L202, 203	2482723H06	6.2 uH choke
L204	2505350F01	.085 uH choke
		SPEAKER:
LS401	5005334D01	Dynamic, 2"; frequency response: 300 to 3500 Hz
		MICROPHONE:
MK401	5982575J02	Cartridge, res: 700 Ω ±20%; Imp: 5000 Ω ±30%
		PLUG:
P1, 2	0105958C97	ASSEMBLY, 10-pin
P201	0105959C38	ASSEMBLY, Cable
		TRANSISTOR: See Note I
Q1	4800869819	NPN; type M9819
Q2	4800869726	N-Channel FET
Q101	4800869494	NPN; type M9494
Q102	4800869906	NPN; type M9906



		RESISTOR, Fixed: Ω ±10%; 1/8 W unless stated
R1	0600185A69	6.8 k ±5%
R2	0600185A55	1.8 k ±5%
R3	0600185A85	33 k ±5%
R4	0600185A65	4.7 k ±5%
R5	0600185A57	2.2 k ±5%
R6	0600185A51	1.2 k ±5%
R7	0600185B64	56
R8	0600185B71	220
R9	0600185B68	120
R10	0600185B83	2.2 k
R11	0600185B55	10
R12	0600185C05	120 k
R101	0600185B83	2.2 k
R102	0600185B98	39 k
R103	0600185B72	270
R105	0600185B87	4.7 k
R201	1805333E01	pot., 25 k; squelch control
R202	1805370E01	pot., 25 k; volume control, includes S203
R203	0600185B64	56
R204	1705787D01	39.2 ±1%; 1/2 W
R207, 208	0600185C04	100 k
R209	0600185B71	220
R210	0600185B93	15 k (1-freq. models)
	or 0600185B96	27 k (2-freq. models)
	---	not used on multi-freq. models
R211 thru 218	1805501C04	pot., 50 k
		SWITCH:
S201	4005120E01	Toggle, DPDT (2-freq. models)
	or 4005119E01	Rotary, 5-pos. (4-freq. models)
	or 4005053E01	Rotary, 8-pos. (6- & 8-freq. models)
S202	3905684E01	Contact, disc
	3905681E01	Contact, feed-thru
S203	---	ON-OFF, part of R202
S401	4005061E01	Toggle, SPDT, "PL"
		HYBRID, Encapsulated:
U2	5184333G07	I-F Amplifier
U3	5184333G08	Low Conversion
U4	5184333G37	Detector
U5	5105177D22	Squelch
U6	5105177D02	Audio Pre-Amplifier
U7	5105177D05	Audio
U8	5105177D13	Receiver Injection

U9	5105177D20	Regulator
U10	5105177D19	Buffer Tripler
U12	NLD6942A	2 W Power Amplifier 150.8-162 MHz
	or NLD6943A	2 W Power Amplifier 162-174 MHz
	or NLD6952A	5 W Power Amplifier 150.8-162 MHz
	or NLD6953A	5 W Power Amplifier 162-174 MHz
U13	5105177D04	IDC
		DIODE: See Note I
VR1, 2	4882256C61	5.8 V Zener
		CRYSTAL: See Note II
Y1	4805713B01	17.865 MHz
	or 4805713B02	17.935 MHz
	NONREFERENCED ITEMS	
	1405601C01	PAD, Insulator (for K101)
	1483211B01	PAD, Insulator (for Q102)
	1505941D01	COVER, Shield (for U9)
	2605685B01	SHIELD, for U4
	2605820D05	SHIELD, Coil (for L1, L5, L103, & L107)
	2605820D07	SHIELD, Coil (for L2, L3, L4, L6, L7, L101 & L104)
	2683379H01	HEATSINK, for Q102
	3905243F01	CONTACT, Ground (for U12)
	7505176E01	PAD, Foam (for channel elements)
	7505295B03	PAD, Insulator (for FL1, FL2, FL3, & Y1)
	0105959C10	CIRCUIT BOARD (for R11 & R12)
	1505894D01	COVER, Shield (for U13)
	7505506D02	MODULE PAD (for U4)
	7505506D03	MODULE PAD (for U3)
	7505506D06	MODULE PAD (for U6 & U13)
	7505506D07	MODULE PAD (for U7)
	7505506D08	MODULE PAD (for U8 & U10)
	7505506D09	MODULE PAD (for U9)

NOTES: I. For optimum performance, order replacement diodes and transistors by Motorola part number only.
II. When ordering crystal units, specify crystal frequency and Motorola part number. Gold faced FL1, FL2, and FL3 crystal filters cannot be mixed with silver can FL1, FL2, and FL3 crystal filters.

UNIVERSAL CIRCUIT BOARD DETAIL AND PARTS LIST

STEP	ADJUST	FOR	MEASURED AT	USING	NOTE
4	Repeat step 3, 3A, or 3B for each channel in the radio; CE2/F2, CE3/F3, CE4/F4, CE5/F5, CE6/F6, CE7/F7, and CE8/F8.				
	20 dB QUIETING TEST (Perform on each channel)				
1	Volume Control R202	2.2 volts ac noise out	External Speaker Jack J201	AC Voltmeter, Tuneup Cable NKN6248	Establishes reference noise level.
2	Signal Generator Frequency	Carrier frequency	External Antenna Jack J202	Signal Generator, Tuneup Cable NKN6248	Reduce output level to zero after setting frequency.
3	Signal Generator Output Level	Slowly increase until noise decreases 20 dB	External Speaker Jack J201	AC Voltmeter, Tuneup Cable NKN6248	Signal level must be less than 0.35 uV.

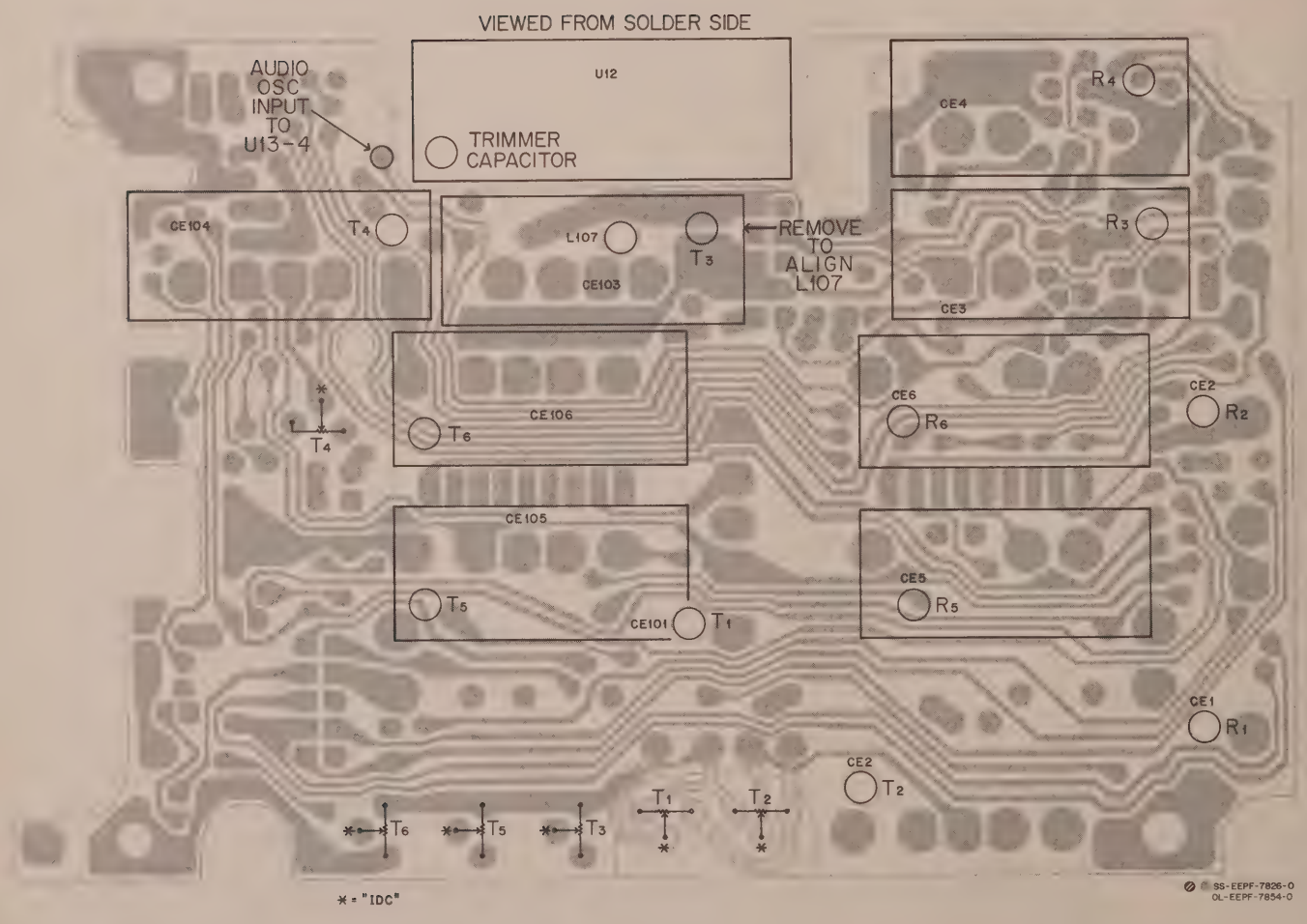
NOTE: CHANNEL ELEMENT (CE1, CE2, ETC.) FREQUENCY

f_c = carrier frequency

f_o = oscillator frequency

$f_c = 3f_o + 17.9$ MHz

EPF-7848-O



INTERCONNECT BOARD ALIGNMENT POINTS

ALIGNMENT

na jack J202.
frequency channel.
and L107 one-eighth inch above circuit board solder side.
ntrol" (IDC) controls R211 through R218 to midrange.
ed."

	NOTE
er	Repeat at least once to ensure a maximum has been obtained.
r, e	Repeat steps 1 and 2.
r, e	If channel element CE103 is used, remove it to gain access to L107 adjustment point. 2-WATT MODELS --- Adjust L107 for 2.1 watts, then adjust U12 trimmer capacitor in direction of minimum current for 2.0 watts. 5-WATT MODELS --- Adjust L107 for 5.0 watts. Reinstall CE103 when this step is complete.
ugh au- e	If tone PL is occupying option position 2, unplug it from the interconnect board to adjust CE101.
e frequency switch to the channel being aligned (CE102/F2, nd CE108/F8).	
ter dB up 48	---
tor asic n- 6 al ter dB up 48	If a channel element board is occupying Option Slot 3, unplug its two channel elements to adjust the IDC controls. Set audio oscillator for an output of 50 mV rms at 1000 Hz.
e frequency switch to the channel being aligned (R212/F2, 8/F8). ement board occupying option slot 3 when adjusting R217/F7.	

1, CE102, ETC.) FREQUENCY

BASIC MT500 TRANSMITTE

UNIVERSAL MT500 TRANSMIT

EPF-7849-O

GENERAL

This radio has been factory aligned and does not require any adjustments. Realignment may be required if components are replaced or have aged. If it is necessary to realign the radio, perform the following procedures:

1. Remove the battery and disassemble the radio as shown in the "Disassembly Procedure." Do not disconnect the front cover receptacle from the interconnect board plug.
2. Connect a dc power supply to the front cover battery contacts: power supply negative to radio negative charging contact and power supply positive to radio positive charging contact (see "Disassembly Procedure").
3. Adjust the power supply output for 15 volts dc.
4. Perform either the "Receiver Alignment" procedure or "Transmitter Alignment" procedure or both procedures as required.

RECEIVER ALIGNMENT

Preliminary Adjustments:
1. Set PL switch S401 to its off (◁) position (if applicable).
2. Set squelch (⌇) control R201 to its maximum counterclockwise position.
3. Set frequency switch S201 to the lowest frequency channel.
4. Preposition slugs of L1, L2, L3, L4, L5, L6, and L7 flush with the circuit board solder side.

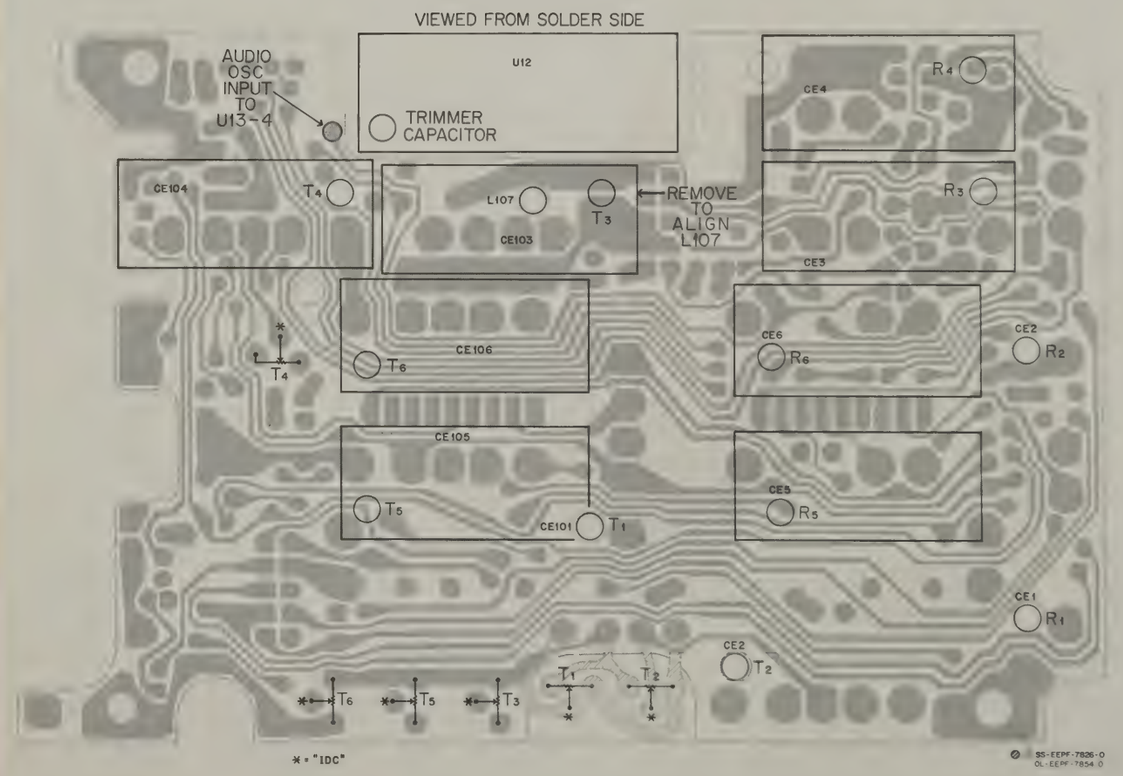
	STEP	ADJUST	FOR	MEASURED AT	USING	NOTE
PREFERRED METHOD	1	L6, L7	Maximum volts dc	M2	DC Multimeter	---
	2	L1, L2, L3, L4, L5	Maximum volts RMS	M1	AC Voltmeter, Signal Generator	Inject carrier frequency signal from the signal generator to the antenna jack (J202). Adjust the signal generator output for an indication on the -30 dBm scale of the voltmeter. Adjust L1, L2, L3, L4, and L5 for a peak at M1. Maintain the voltmeter reading on the -30 dBm scale by reducing the signal generator output.
	3	Channel Element CE1	The frequency marked on channel element CE1. See Note (channel element frequency)	M1	Signal Generator, 17.9 MHz Crystal Oscillator, AC Voltmeter, Frequency Counter	Reduce signal generator to minimum output, and inject signal from 17.9 MHz ±100 Hz crystal oscillator into crystal filter FL1 to produce at least a 10 dB rise in signal at M1. Count the low i-f frequency through the ac voltmeter and frequency counter at M1. Record the reading within ±10 Hz; this reference must read 35 kHz ±1.5 kHz. Turn off 17.9 MHz oscillator, and adjust signal generator to the exact carrier frequency and output for a -40 dBm reading at M1. Adjust channel element CE1 to produce the previously recorded i-f frequency ±50 Hz.
ALTERNATE METHODS	3A	Channel Element CE1	The frequency marked on channel element CE1. See Note (channel element frequency)	M1	Signal Generator, 17.9 MHz Crystal Oscillator, AC Voltmeter, Oscilloscope	Reduce signal generator to minimum output. and inject signal from a 17.9 MHz ±100 Hz crystal oscillator into crystal filter FL1. Adjust signal generator output level for a -40 dBm reading at M1. Connect the output of the ac voltmeter to an oscilloscope, and set the time base to 5 ms per division and the gain to display signal amplitude of approximately 3 divisions. Set the signal generator to the exact carrier frequency, and increase the output until the waveform on the oscilloscope appears as an amplitude modulated signal. This signal is the resultant of 17.9 MHz crystal oscillator signal mixing with the first i-f signal which will not be exactly 17.9 MHz until the first oscillator is warped to the precise frequency by adjusting channel element CE1. Adjust channel element CE1 while viewing the signal on the oscilloscope for a zero beat or the lowest possible amplitude modulating frequency. This method will provide an accuracy of ±100 Hz adjustment of the first oscillator.
	3B	Channel Element CE1	The frequency marked on channel element CE1. See Note (channel element frequency)	M1	Signal Generator, 17.9 MHz Crystal Oscillator, AC Voltmeter	Reduce signal generator to minimum output and inject signal from a 17.9 MHz ±100 Hz crystal oscillator into crystal filter FL1. Adjust signal generator output level for a -40 dBm reading at M1. Listen to the audio output. Set the signal generator to the exact carrier frequency, and increase the output until an audio tone is heard. This tone is the resultant of 17.9 MHz crystal oscillator signal mixing with the first i-f signal which will not be exactly 17.9 MHz until the first oscillator is warped to the precise frequency by adjusting channel element CE1. Adjust channel element CE1 for a zero beat (no audio tone is heard when properly adjusted).

(Cont'd)

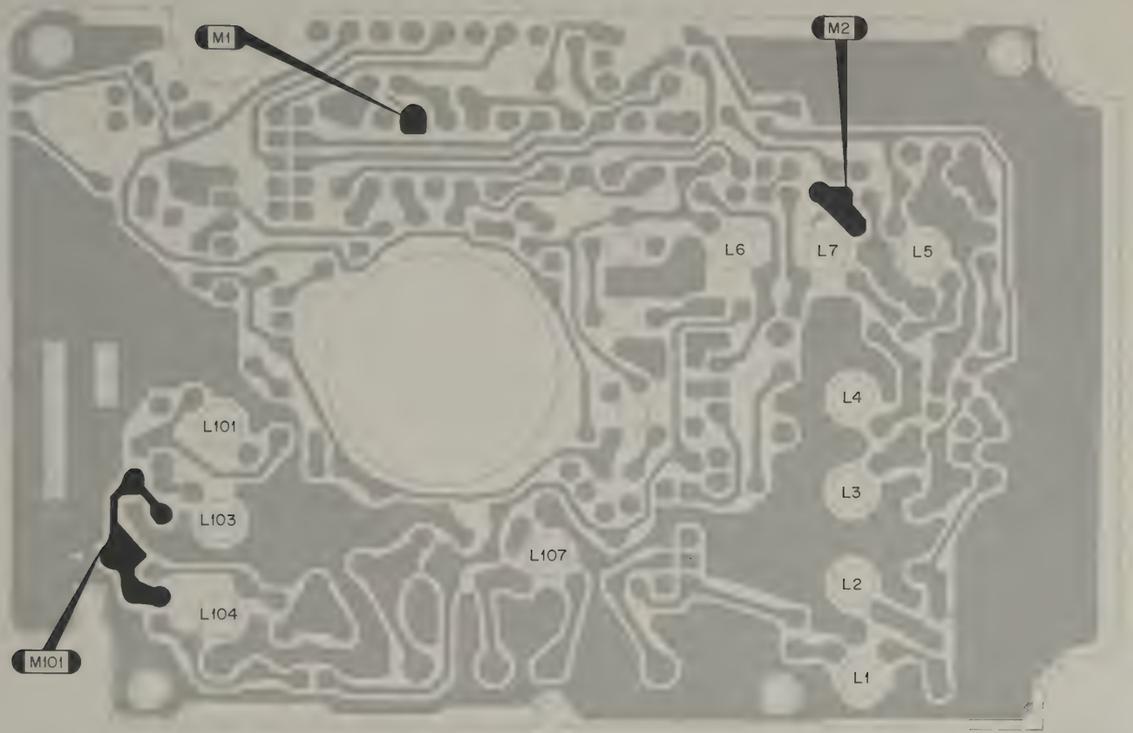
STEP	ADJUST	FOR	MEASURED AT	USING	NOTE
4	Repeat step 3, 3A, or 3B for each channel in the radio; CE2/F2, CE3/F3, CE4/F4, CE5/F5, CE6/F6, CE7/F7, and CE8/F8.				
	20 dB QUIETING TEST (Perform on each channel)				
1	Volume Control R202	2.2 volts ac noise out	External Speaker Jack J201	AC Voltmeter, Tuneup Cable NKN6248	Establishes reference noise level.
2	Signal Generator Frequency	Carrier frequency	External Antenna Jack J202	Signal Generator, Tuneup Cable NKN6248	Reduce output level to zero after setting frequency.
3	Signal Generator Output Level	Slowly increase until noise decreases 20 dB	External Speaker Jack J201	AC Voltmeter, Tuneup Cable NKN6248	Signal level must be less than 0.35 uV.

NOTE: CHANNEL ELEMENT (CE1, CE2, ETC.) FREQUENCY
f_c = carrier frequency
f_o = oscillator frequency
$f_c = 3f_o + 17.9$ MHz

EPF-7848-O

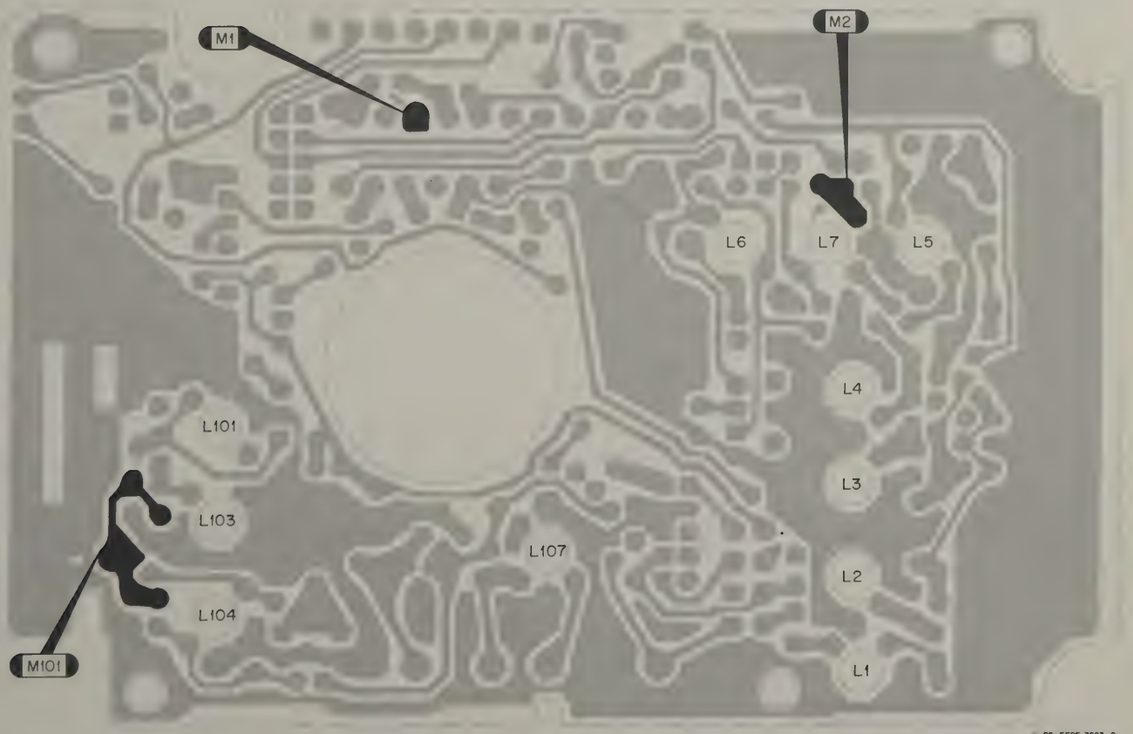


INTERCONNECT BOARD ALIGNMENT POINTS



BS-EEPF-7820-O
OL-EEPF-7852-O

BASIC MT500 TRANSMITTER-RECEIVER ALIGNMENT POINTS



BS-EEPF-7823-O
OL-EEPF-7852-O

UNIVERSAL MT500 TRANSMITTER-RECEIVER ALIGNMENT POINTS

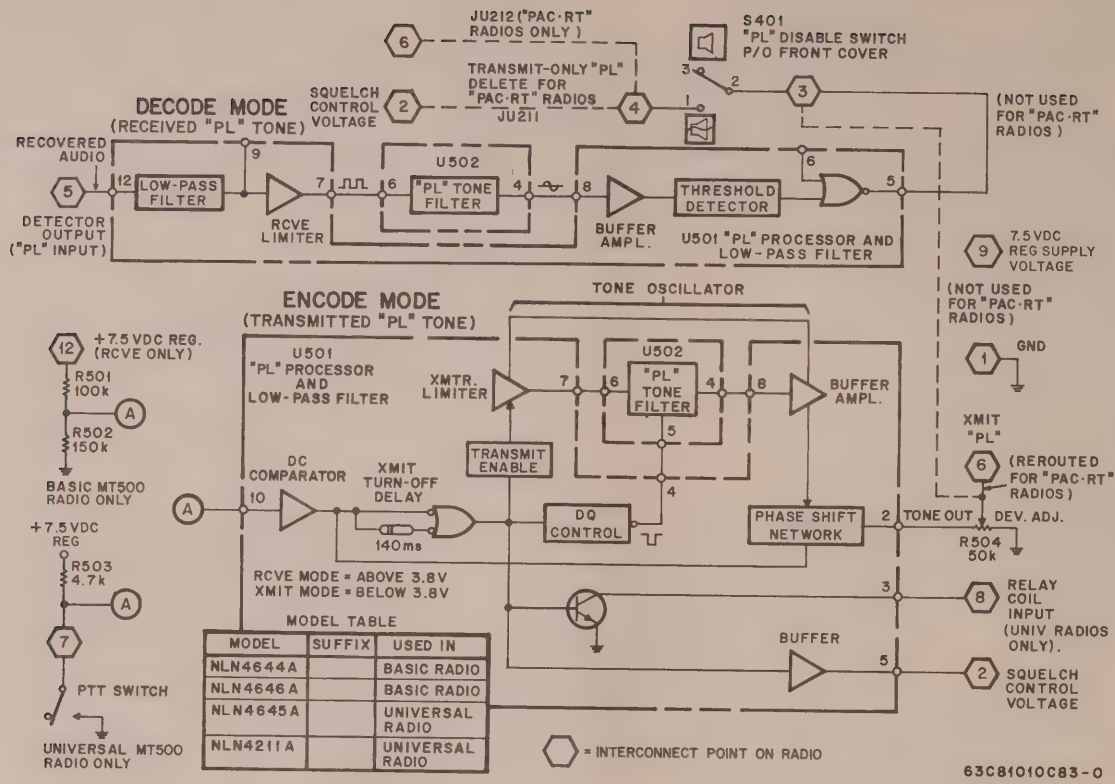
TRANSMITTER ALIGNMENT

Preliminary Adjustments:
1. Connect a 50-ohm load to external antenna jack J202.
2. Set frequency switch S201 to the lowest frequency channel.
3. Preposition slugs of L101, L103, L104, and L107 one-eighth inch above circuit board solder side.
4. Preposition "Instantaneous Deviation Control" (IDC) controls R211 through R218 to midrange.
5. Make all measurements with radio "keyed."

STEP	ADJUST	FOR	MEASURED AT	USING	NOTE
1	L101, L103	Maximum negative dc voltage (typically -1.0 VDC)	M101	DC Multimeter	Repeat at least once to ensure a maximum has been obtained.
2	L104, Trimmer Capacitor on top of U12	Maximum power output	External Antenna Jack J202	RF Wattmeter, Tuneup Cable NKN6248	Repeat steps 1 and 2.
3	L107 and U12 Trimmer Capacitor for 2-watt radios; L107 for 5-watt radios	Specified power	External Antenna Jack J202	RF Wattmeter, Tuneup Cable NKN6248	If channel element CE103 is used, remove it to gain access to L107 adjustment point. 2-WATT MODELS --- Adjust L107 for 2.1 watts, then adjust U12 trimmer capacitor in direction of minimum current for 2.0 watts. 5-WATT MODELS --- Adjust L107 for 5.0 watts. Reinstall CE103 when this step is complete.
4	Channel Element CE101 Warp Coil	The frequency marked on channel element CE101. See Note (channel element frequency)	External Antenna Jack J202	Frequency Counter through a 30 dB attenuating pad, Tuneup Cable NKN6248	If tone PL is occupying option position 2, unplug it from the interconnect board to adjust CE101.
5	Repeat step 4 for each channel in the radio; be sure to set the frequency switch to the channel being aligned (CE102/F2, CE103/F3, CE104/F4, CE105/F5, CE106/F6, CE107/F7, and CE108/F8).				
6	"Private-Line" Deviation Control (Tone PL - R504; Digital PL - R605), if applicable.	±750 Hz deviation	External Antenna Jack J202	Deviation Meter through a 30 dB pad and Tuneup Cable NKN6248	---
7	F1 IDC Control R211	±5.0 kHz deviation	External Antenna Jack J202	Audio Oscillator connected to U13-4 of a Basic radio or to Universal connector J203-6 of a Universal radio. Deviation Meter through a 30 dB pad and Tuneup Cable NKN6248	If a channel element board is occupying Option Slot 3, unplug its two channel elements to adjust the IDC controls. Set audio oscillator for an output of 50 mV rms at 1000 Hz.
8	Repeat step 7 for each channel in the radio; be sure to set the frequency switch to the channel being aligned (R212/F2, R213/F3, R214/F4, R215/F5, R216/F6, R217/F7, and R218/F8). NOTE: Reinstall the two channel elements on the channel element board occupying option slot 3 when adjusting R217/F7.				

NOTE: CHANNEL ELEMENT (CE101, CE102, ETC.) FREQUENCY
f_c = carrier frequency
f_o = oscillator frequency
$f_c = 3f_o$

EPF-7849-O



"PL" SQUELCH SENSITIVITY CHECK

("PL" MODELS ONLY)

1. SET THE SQUELCH CONTROL (R201) TO THE UNSQUELCHED POSITION WITH THE "PL" SWITCH OFF (◁).
2. TURN THE "PL" SWITCH ON (◁), AND APPLY AN ON-FREQUENCY CARRIER SIGNAL FROM THE SIGNAL GENERATOR. MODULATE THE SIGNAL GENERATOR WITH THE PROPER "PL" TONE, AT ±0.5 kHz DEVIATION.
3. THE SQUELCH CIRCUIT SHOULD "OPEN" WHEN THE SIGNAL GENERATOR OUTPUT IS INCREASED ABOVE 0.18 uV (VHF) OR 0.25 uV (UHF).

EPF-7867-O

TEST MEASUREMENTS

PIN NO.	ENCODE		DECODE	
	DC VOLTS	AC VOLTS	DC VOLTS	AC VOLTS
PL Processor and Low Pass Filter U501				
2	---	250 mV (3)	---	---
3	<1.5	---	15	---
5	---	---	≤ 4 (open) > 0.6 (closed) (1)	
7	7.4	100 mV rms (<-15 dBm)	7.2 (2)	350 mV rms (>-15 dBm)
8	1.7	80 mV rms (3)	1.7	160 mV rms (3)
9	---	---	---	280 mV rms (typical)
10	<3.8	---	>3.8	---
11	7.5	---	7.5	---
PL Tone Filter U502				
3	7.5	---	7.5	---
4	1.7	---	1.7	---
5	>6	---	>6	---
6	7.4	---	7.2 (2)	---

Test measurements are nominal. DC voltages are with 15 VDC power supply, and AC voltages are with radio fully quieted and 500 Hz deviation on generator (proper PL tone).
Numbers in ( ) refer to the following notes:
(1) PL switch on (◁).
(2) No modulation; radio fully quieted.
(3) Depends upon PL Tone Filter U502.

EPF-7866-O

TONE "PRIVATE-LINE" DECK

MOS CIRCUITS HANDLING PRECAUTIONS

The following handling precautions are recommended for MOS circuits:

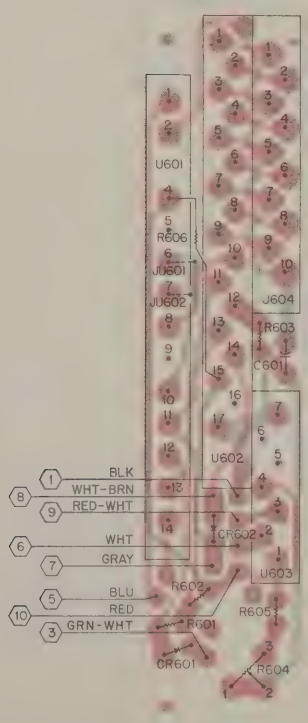
1. All MOS devices should be stored or transported in conductive material so that all exposed leads are shorted together. MOS devices must not be inserted into conventional plastic "snow" or plastic trays of the type used for storage and transportation of other semiconductor devices.
2. All MOS devices should be placed on a grounded bench surface and the technicians should ground themselves prior to handling devices. This is done most effectively by having the technician wear a conductive wrist strap in series with 100 k ohms to ground.
3. Nylon clothing should not be worn while handling MOS circuits.
4. Do not insert or remove MOS devices with power applied. Check all power supplies to be used for testing MOS devices and be certain there are no voltage transients present.
5. When lead straightening, provide ground straps for the apparatus used.
6. When soldering, use a grounded soldering iron.
7. All power should be turned off in a system before printed circuit boards containing MOS devices are inserted or removed.
8. All printed circuit boards containing MOS devices should be provided with shorting straps across the edge connector when being carried or transported.
9. MOS devices should be handled by their packages and not by the leads, if at all possible. Prior to touching the unit, the technician should touch an electrical ground to remove any static charge that may have been accumulated. The package and substrate may be electrically common. If so, the reaction of a discharge to the case would cause the same damage as touching the leads.

NOTE

These precautions are especially true in low humidity conditions.

EPF-7202-O

VIEWED FROM SOLDER SIDE



SS-DEPF-7868-O
CS-DEPF-7869-O
DL-DEPF-7870-O

PARTS LIST

NLN4212A Digital "PL" Deck PLF-1244-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, Fixed:
C601	2184008H13	.05 uF ±20%; 25 V
		DIODE: See Note
CR601		Silicon
CR602		Silicon
		RESISTOR, Fixed: ∩ ±10%; 1/8 W unless stated
R601	0600185C02	68 k
R602	0600185B89	6.8 k
R603	0600185B92	12 k
R604	1805501C11	Pot., 500 k
R605	0600185C03	82 k
R606	0600185B87	4.7 k
		INTEGRATED CIRCUIT:
U601	5105177D25	Code Conditioner
U602	5105854B79	Digital Processor
U603	5105854B78	Encode Filter
U604	NLN8922A	Code Plug
NONREFERENCED ITEMS		
	0905287C0	SOCKET, Berg; circuit board
	4205175E01	RETAINER, Spacer
	8405326E01	CIRCUIT BOARD

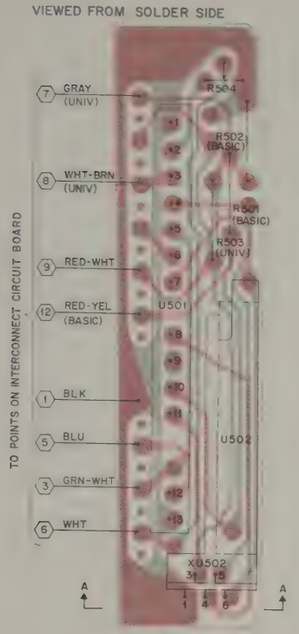
NOTE: For optimum performance, order replacement diodes by Motorola part number only.

"PL" SQUELCH SENSITIVITY CHECK

1. SET THE SQUELCH CONTROL (R201) TO THE THRESHOLD POSITION WITH THE "PL" SWITCH OFF (◁).
2. TURN THE "PL" SWITCH ON (◁), AND APPLY AN ON-FREQUENCY CARRIER SIGNAL FROM THE SIGNAL GENERATOR. MODULATE THE SIGNAL GENERATOR WITH THE PROPER DIGITAL "PL" CODE.
3. THE SQUELCH CIRCUIT SHOULD "OPEN" WHEN THE SIGNAL GENERATOR OUTPUT IS INCREASED ABOVE 0.18 uV (VHF) OR 0.25 uV (UHF).

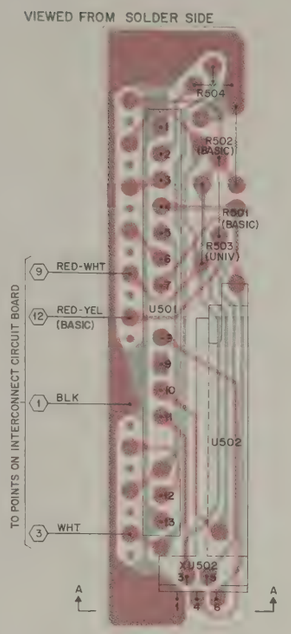
EPF-7872-O

NLN4211A, NLN4644A, NLN4645A, NLN4646A



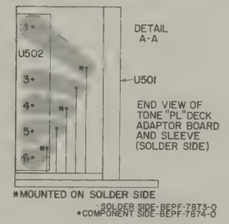
SS-DEPF-7863-O
CS-DEPF-7864-O
OL-DEPF-7865-O

NLN4768A



SS-DEPF-7863-O
CS-DEPF-7864-O
OL-DEPF-8042-O

VIEWED FROM SOLDER SIDE



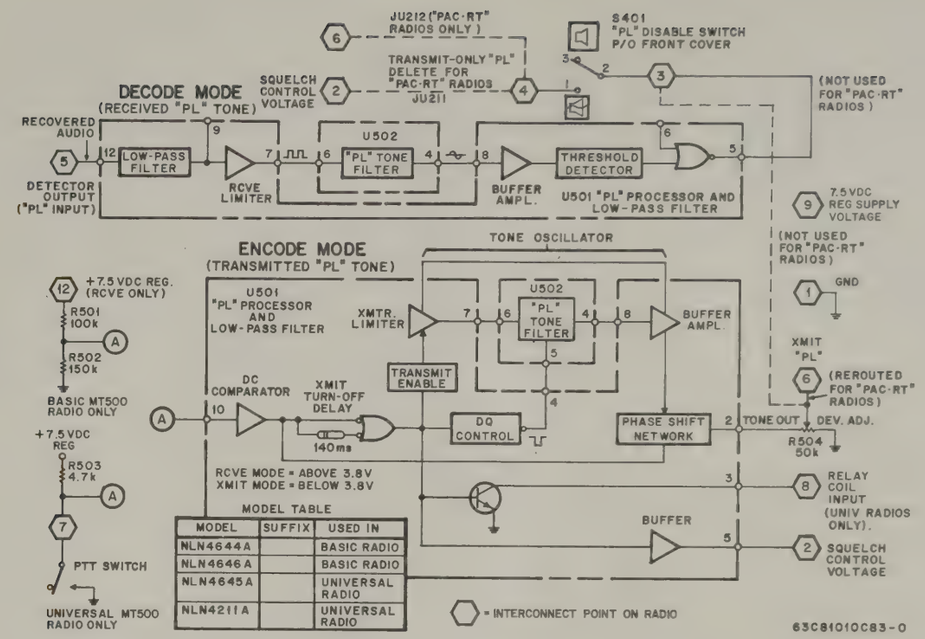
SOLDER SIDE-BEPF-7873-O
*COMPONENT SIDE-BEPF-7874-O

Tone PL Decks
NLN4211A Universal Long Frame
NLN4644A Basic Short Frame
NLN4645A Universal Short Frame
NLN4646A Basic Long Frame
NLN4768A Basic Long Frame (PAC•RT) PLF-1243-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		RESISTOR, Fixed: Ω
R501	0600185C04	100 k ±10%; 1/8 W (NLN4644A, NLN4646A)
R502	0600185C06	150 k ±10%; 1/8 W (NLN4644A, NLN4646A)
R503	0600185B87	4.7 k ±10%; 1/8 W (NLN4211A, NLN4645A)
R504	1805501C04	Pot., 50 k
		INTEGRATED CIRCUIT:
U501	5105177D23	PL Processor and Low-Pass Filter
U502	NFN6010A	PL Tone Filter (Not part of Tone PL Decks)
	NONREFERENCED ITEMS	
	0105950D70	Assembly, Adapter: contains circuit board & bracket (NLN4644A, NLN4645A)
	0105959C02	Assembly, Adapter; contains circuit board & bracket (NLN4211A, NLN4646A)
	0905287C05	SOCKET, Berg; circuit board
	0905604C06	SOCKET, Spring
	3005373E01	CABLE, Circuit Board (NLN4644A, NLN4645A)
	4205796E01	CLIP (NLN4644A, NLN4645A)

LONG FRAME SHORT FRAME

TONE "PRIVATE-LINE" DECK



"PL" SQUELCH SENSITIVITY CHECK

("PL" MODELS ONLY)

1. SET THE SQUELCH CONTROL (R201) TO THE UNSQUELCHED POSITION WITH THE "PL" SWITCH OFF ( ).
2. TURN THE "PL" SWITCH ON ( ), AND APPLY AN ON-FREQUENCY CARRIER SIGNAL FROM THE SIGNAL GENERATOR. MODULATE THE SIGNAL GENERATOR WITH THE PROPER "PL" TONE, AT ±0.5 kHz DEVIATION.
3. THE SQUELCH CIRCUIT SHOULD "OPEN" WHEN THE SIGNAL GENERATOR OUTPUT IS INCREASED ABOVE 0.18 uV (VHF) OR 0.25 uV (UHF).

EPF-7867-O

TEST MEASUREMENTS

PIN NO.	ENCODE DC VOLTS	ENCODE AC VOLTS	DECODE DC VOLTS	DECODE AC VOLTS
PL Processor and Low Pass Filter U501				
2	---	250 mV (3)	---	---
3	<1.5	---	15	---
5	---	---	≤ 4 (open) > 0.6 (closed) (1)	
7	7.4	100 mV rms (<-15 dBm)	7.2 (2)	350 mV rms (>-15 dBm)
8	1.7	80 mV rms (3)	1.7	160 mV rms (3)
9	---	---	---	280 mV rms (typical)
10	<3.8	---	>3.8	---
11	7.5	---	7.5	---
PL Tone Filter U502				
3	7.5	---	7.5	---
4	1.7	---	1.7	---
5	>6	---	>6	---
6	7.4	---	7.2 (2)	---

Test measurements are nominal. DC voltages are with 15 VDC power supply, and AC voltages are with radio fully quieted and 500 Hz deviation on generator (proper PL tone).
Numbers in ( ) refer to the following notes:
(1) PL switch on ( ).
(2) No modulation; radio fully quieted.
(3) Depends upon PL Tone Filter U502.

EPF-7866-O

MOS CIRCUITS HANDLING PRECAUTIONS

The following handling precautions are recommended for MOS circuits:

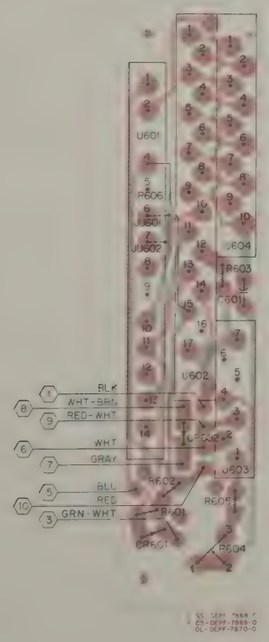
1. All MOS devices should be stored or transported in conductive material so that all exposed leads are shorted together. MOS devices must not be inserted into conventional plastic "snow" or plastic trays of the type used for storage and transportation of other semiconductor devices.
2. All MOS devices should be placed on a grounded bench surface and the technicians should ground themselves prior to handling devices. This is done most effectively by having the technician wear a conductive wrist strap in series with 100 k ohms to ground.
3. Nylon clothing should not be worn while handling MOS circuits.
4. Do not insert or remove MOS devices with power applied. Check all power supplies to be used for testing MOS devices and be certain there are no voltage transients present.
5. When lead straightening, provide ground straps for the apparatus used.
6. When soldering, use a grounded soldering iron.
7. All power should be turned off in a system before printed circuit boards containing MOS devices are inserted or removed.
8. All printed circuit boards containing MOS devices should be provided with shorting straps across the edge connector when being carried or transported.
9. MOS devices should be handled by their packages and not by the leads, if at all possible. Prior to touching the unit, the technician should touch an electrical ground to remove any static charge that may have been accumulated. The package and substrate may be electrically common. If so, the reaction of a discharge to the case would cause the same damage as touching the leads.

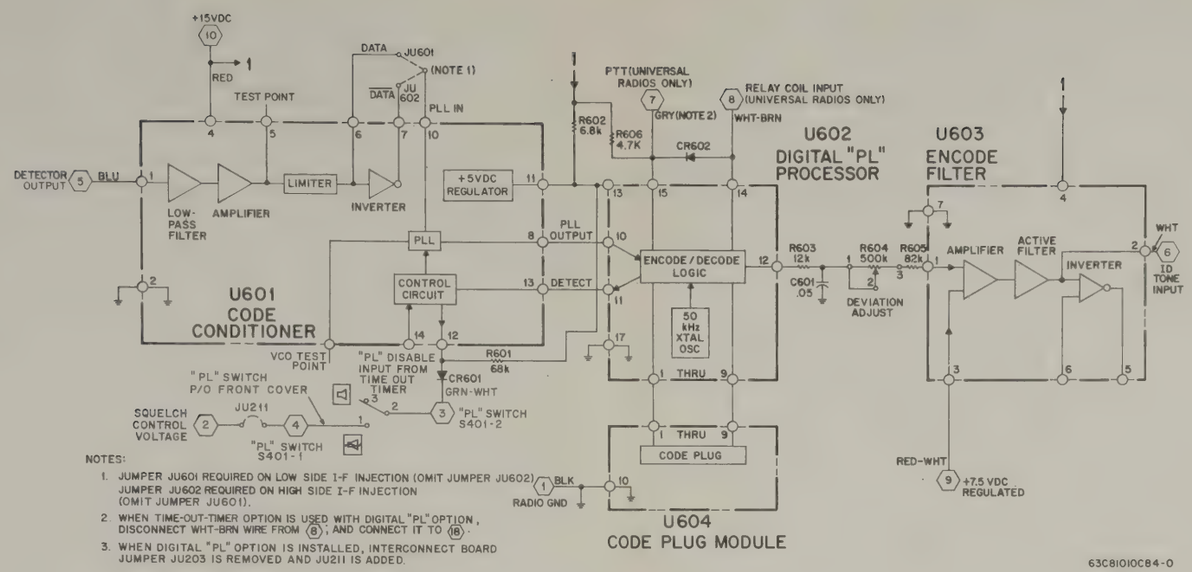
NOTE

These precautions are especially true in low humidity conditions.

EPF-7202-O

VIEWED FROM SOLDER SIDE





63C81010C84-O

TEST MEASUREMENTS

PIN NO.	ENCODE VOLTAGE	ENCODE WAVEFORM	DECODE VOLTAGE	DECODE WAVEFORM
Code Conditioner U601				
4	15.0 V dc	- - -	15.0 V dc	- - -
5	7.5 V dc	- - -	7.5 V dc	Disc. Noise Amplified to ≈0.5 V p-p
6	- - -	- - -	≈7.5 V	10 V p-p (1)
	- - -	- - -	≈7.5 V	10 V p-p (1)
7	- - -	- - -	≈7.5 V	10 V p-p (1)
	- - -	- - -	≈7.5 V	10 V p-p (1)
8	3.5 V dc	5.2 V p-p @ ≈ 100 Hz	2.7 V	Random 5.2 V p-p
10	- - -	- - -	≈7.5 V	≈100 Hz 5.2 V p-p
	- - -	- - -	≈7.5 V	10 V p-p (1)
11	5.45 V dc	- - -	5.45 V dc	- - -
12	-0.33 V dc (2)	- - -	1.07 V dc (2)	- - -
	0 (3)	- - -	0 (3)	- - -
13	0	- - -	0	- - -
14	0	- - -	0	- - -
	15.0 V dc (3)	- - -	15.0 V dc (3)	- - -
Code Plug U604				
1 thru 9	4.6 V dc (4)	- - -	5.5 V dc (4)	- - -

PIN NO.	ENCODE VOLTAGE	ENCODE WAVEFORM	DECODE VOLTAGE	DECODE WAVEFORM
Digital PL Processor U602				
1 thru 9	4.6 V dc (4)	- - -	5.5 V dc (4)	- - -
10	3.4 V dc	5.5 V p-p @ 100 Hz	2.6 V dc	Random 5.5 V p-p
11	0	- - -	0	- - -
12	2.3 V dc	Random 5.5 V p-p	2.7 V dc	135 Hz @ 5.5 V p-p
13	≈5.5 V dc	- - -	5.7 V dc	- - -
14	0.77 V dc	- - -	15.0 V dc	- - -
15	0	- - -	14.3 V dc	- - -
17	Ground	- - -	Ground	- - -
Encode Filter U603				
1	3.3 V dc	Random 3.6 V p-p	2.1 V dc	135 Hz @ 4.0 V p-p
2	0	1.0 V p-p (5)		
3	7.5 V dc	- - -	7.5 V dc	- - -
4	15.0 V dc	- - -	15.0 V dc	- - -
5	- - -	- - -	- - -	- - -
6	- - -	- - -	- - -	- - -
7	Ground	- - -	Ground	- - -

* Test measurements are nominal; PL switch on or off and no carrier input.
Numbers in ( ) refer to the following notes:
(1) Digital waveform
(2) PL switch on
(3) PL switch off
(4) Code plug removed
(5) Changes to 135 Hz sine wave (turn-off code) on dekey of PTT switch

EPF-7871-O

PARTS LIST

NLN4212A Digital "PL" Deck PLF-1244-O

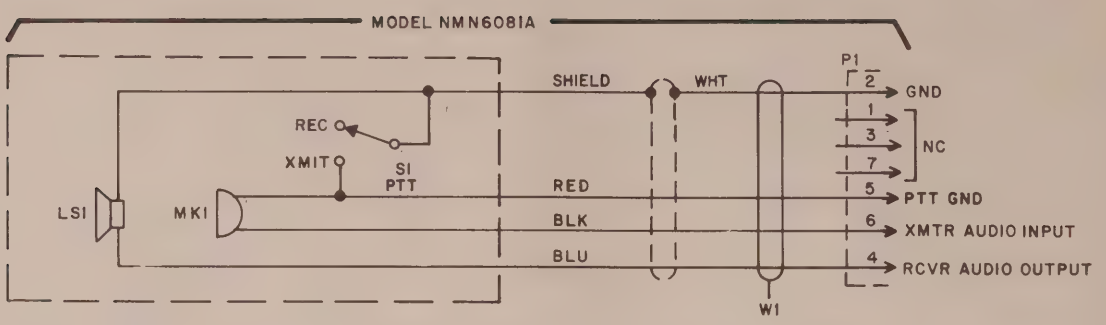
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, Fixed:
C601	2184008H13	.05 uF ±20%; 25 V
		DIODE: See Note
CR601		Silicon
CR602		Silicon
		RESISTOR, Fixed; ± ±10%; 1/8 W unless stated
R601	0600185C02	68 k
R602	0600185B89	6.8 k
R603	0600185B92	12 k
R604	1805501C11	Pot., 500 k
R605	0600185C03	82 k
R606	0600185B87	4.7 k
		INTEGRATED CIRCUIT:
U601	5105177D25	Code Conditioner
U602	5105854B79	Digital Processor
U603	5105854B78	Encode Filter
U604	NLN8922A	Code Plug
NONREFERENCED ITEMS		
	0905287C0	SOCKET, Berg; circuit board
	4205175E01	RETAINER, Spacer
	8405326E01	CIRCUIT BOARD

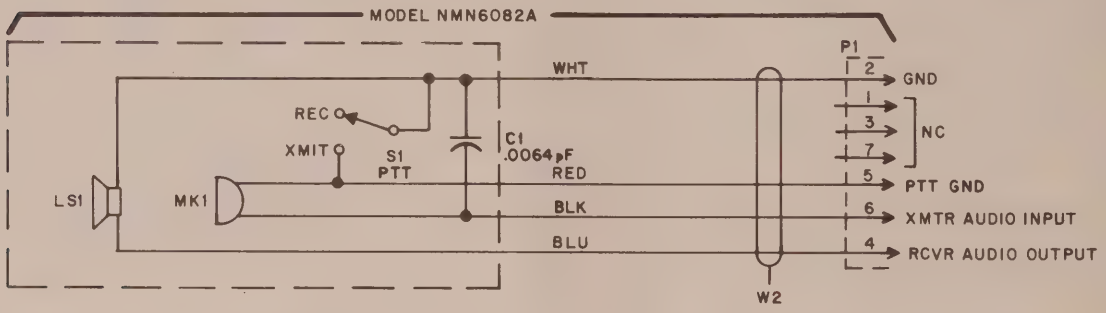
NOTE: For optimum performance, order replacement diodes by Motorola part number only.

"PL" SQUELCH SENSITIVITY CHECK

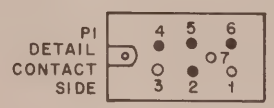
1. SET THE SQUELCH CONTROL (R201) TO THE THRESHOLD POSITION WITH THE "PL" SWITCH OFF ( ).
2. TURN THE "PL" SWITCH ON ( ), AND APPLY AN ON-FREQUENCY CARRIER SIGNAL FROM THE SIGNAL GENERATOR. MODULATE THE SIGNAL GENERATOR WITH THE PROPER DIGITAL "PL" CODE.
3. THE SQUELCH CIRCUIT SHOULD "OPEN" WHEN THE SIGNAL GENERATOR OUTPUT IS INCREASED ABOVE 0.18 uV (VHF) OR 0.25 uV (UHF).

EPF-7872-O





MODELS	SUFFIX
NMN6081A	
NMN6082A	



63B81102C46-O

Speaker-Microphone Kits:
NMN6081A Straight Cord
NMN6082A Coiled Cord

PLF-1238-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
C1	2184008H05	CAPACITOR, Fixed: .0064 uF ±10%; 50 V (NMN6082A only)
LS1	5005334D01	SPEAKER, Dynamic: 39 Ω, 2-inch diameter
MK1	5982575J02	MICROPHONE: Miniature; Res: 700 Ω, Imped: 5000 Ω ±30%
P1	2805763D02	PLUG: Connector, 7-contact
S1	4082159D02	SWITCH: Micro; PTT, SPDT
W1	3084048H02	CORD: Straight, 48"
W2	3084123H02	Coiled

EXTERNAL SPEAKER-MICROPHONES

GENERAL

This revision outlines changes that have occurred since the printing of your service booklet. Installation of these changes in earlier equipment is not necessary except as recommended in Motorola Service and Repair Notes (SRN's).

REVISION DETAILS

Item No.	Change Affects	New Number	New Suffix
1	General Information	---	---

CHANGES

Item No.

1 On page 3 (Interconnect Circuit Board Detail),

a. reverse C204 symbol;
b. channel element CE2 area, change JU212 to read: JU216

On page 4 (Basic Circuit Board Detail and Parts List) and on page 7 (Universal Circuit Board Detail and Parts List), make the following parts list changes:

Ref. Sym.	Action	Part Number	Description
C17	deleted		
C18	changed to	2100861435	70 pF ±10%; 75 V
			CHANNEL ELEMENT:
CE1 thru 8	changed to	KXN1075A	Receiver, use as required, depending on model
CE101 thru 108	change to	KXN1083A	2 W Transmitter, use as required, depending on model
CE101 thru 108	add	or KXN1042A	5 W Transmitter, use as required, depending on model
FL1, FL2, FL3	change (silver can) to (gold faced) and vice versa		
R14	add	0600185A57	2.2 k

a. delete C17 from circuit board detail and add a jumper in its place.
b. add R14 across L5.

On page 5 (Basic Schematic Diagram),

a. in "PL" Switch S401 circuitry, change JU212 to read: JU216
b. delete C17 and add a jumper in its place.
c. add R14 symbol across L5.
d. add "Second Oscillator Crystal Frequencies" table.

SECOND OSCILLATOR CRYSTAL FREQUENCIES

CARRIER FREQUENCY f_c	FIRST OSCILLATOR CRYSTAL FREQUENCY f_{o1}	SECOND OSCILLATOR CRYSTAL FREQUENCY f_{o2}
146.90 - 151.70 MHz	43.00 - 44.60 MHz	17.865 MHz
151.70 - 152.30 MHz	44.60 - 44.80 MHz	17.935 MHz
152.30 - 157.10 MHz	44.80 - 46.40 MHz	17.865 MHz
157.10 - 157.70 MHz	46.40 - 46.60 MHz	17.935 MHz
157.70 - 160.70 MHz	46.60 - 47.60 MHz	17.865 MHz
160.70 - 161.30 MHz	47.60 - 47.80 MHz	17.935 MHz
161.30 - 165.20 MHz	47.80 - 49.10 MHz	17.865 MHz
165.20 - 165.80 MHz	49.10 - 49.30 MHz	17.935 MHz
165.80 - 167.90 MHz	49.30 - 50.00 MHz	17.865 MHz
167.90 - 168.50 MHz	50.00 - 50.20 MHz	17.935 MHz
168.50 - 169.70 MHz	50.20 - 50.60 MHz	17.865 MHz
169.70 - 170.30 MHz	50.60 - 50.80 MHz	17.935 MHz
170.30 - 175.00 MHz	50.80 - 52.37 MHz	17.865 MHz

CRYSTAL FORMULA: $f_c = 3 f_{o1} + 17.9$ MHz

On page 6 (Universal Schematic Diagram),

a. delete C17 and add a jumper in its place.
b. add R14 symbol across L5
c. add "Second Oscillator Crystal Frequencies" table.

SECOND OSCILLATOR CRYSTAL FREQUENCIES

CARRIER FREQUENCY f_c	FIRST OSCILLATOR CRYSTAL FREQUENCY f_{o1}	SECOND OSCILLATOR CRYSTAL FREQUENCY f_{o2}
150.80 - 151.70 MHz	43.00 - 44.60 MHz	17.865 MHz
151.70 - 152.30 MHz	44.60 - 44.80 MHz	17.935 MHz
152.30 - 157.10 MHz	44.80 - 46.40 MHz	17.865 MHz
157.10 - 157.70 MHz	46.40 - 46.60 MHz	17.935 MHz
157.70 - 160.70 MHz	46.60 - 47.60 MHz	17.865 MHz
160.70 - 161.30 MHz	47.60 - 47.80 MHz	17.935 MHz
161.30 - 165.20 MHz	47.80 - 49.10 MHz	17.865 MHz
165.20 - 165.80 MHz	49.10 - 49.30 MHz	17.935 MHz
165.80 - 167.90 MHz	49.30 - 50.00 MHz	17.865 MHz
167.90 - 168.50 MHz	50.00 - 50.20 MHz	17.935 MHz
168.50 - 169.70 MHz	50.20 - 50.60 MHz	17.865 MHz
169.70 - 170.30 MHz	50.60 - 50.80 MHz	17.935 MHz
170.30 - 175.00 MHz	50.80 - 52.37 MHz	17.865 MHz

CRYSTAL FORMULA: $f_c = 3 f_{o1} + 17.9$ MHz

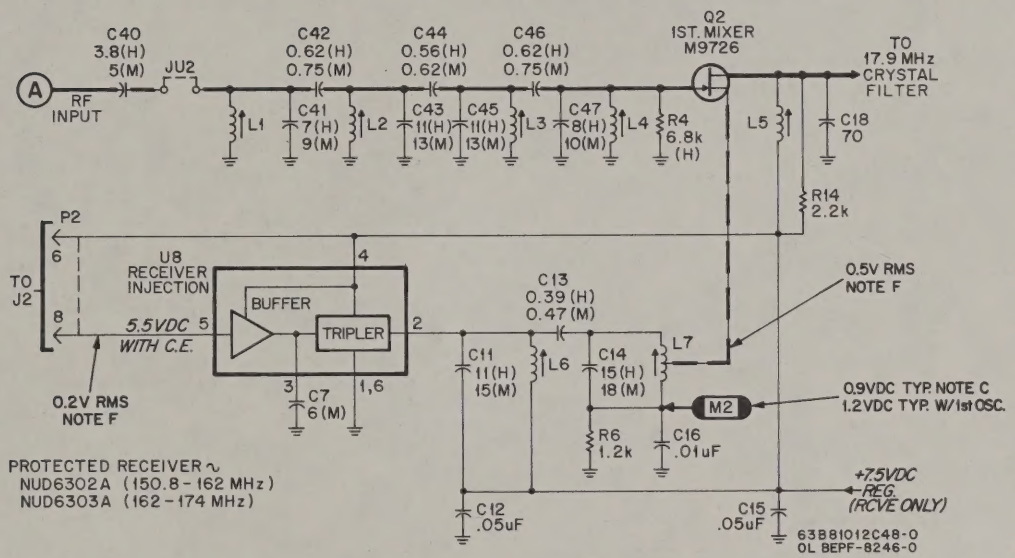
On page 10 (Tone "Private-Line" Deck), make the following changes on NLN4768A Circuit Board Detail:

a. delete R501, R502, & R503
b. add JU501 in place of R502

On page 10 (Tone "Private-Line" Deck), make the following changes on the Schematic Diagram:

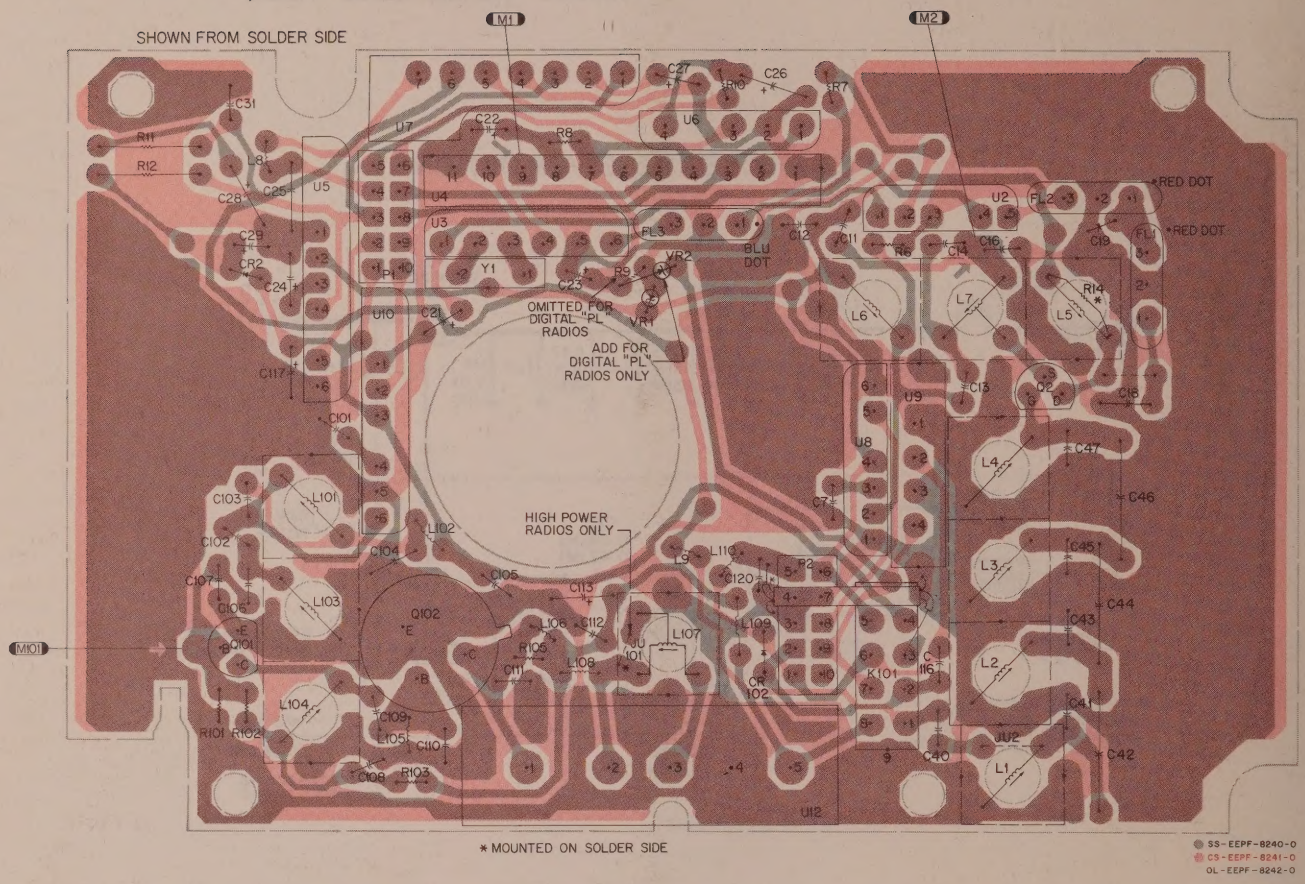
a. add JU501 across R502 and add NOTE: FOR "PAC•RT" RADIOS, R501 & R502 DELETED AND JU501 ADDED.
b. between interconnect points 4 & 6, change JU212 to read: JU216.
c. between interconnect points 3 & 6, change note to read (USED FOR "PAC•RT" RADIOS).

PROTECTED RECEIVER OPTION



PLF-1324-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, Fixed: pF ± 5%; 25 V; N150 unless stated
C7	2105311E20	6 (M only)
C11	2105311E02	15 (M)
	or 2105311E17	11 (H)
C12	2184008H13	0.05 uF ± 20%; 50 V; Y5R
C13	2182450B24	0.47 ± 10%; 500 V (M)
	or 2182450B21	0.39 ± 10%; 500 V (H)
C14	2105311E16	18 (M)
	or 2105311E02	15 (H)
C15	2184008H13	0.05 uF ± 20%; 50 V; Y5R
C16	2184008H24	0.01 uF ± 10%; 50 V; Y5F
C17	2182358G18	125
C18	2182358G30	150; N220
C40	2182877B17	5 ± .25 pF; 75 V (M)
	or 2182877B09	3.8 ± .25 pF; 75 V (H)
C41	2105311E12	9; 100 V (M)
	or 2105311E18	7 (H)
C42	2182450B22	0.75 ± 10%; 500 V (M)
	or 2182450B41	0.62 ± 10%; 500 V (H)
C43	2105311E08	13 (M)
	or 2105311E17	11 (H)
C44	2182450B41	0.62 ± 10%; 500 V (M)
	or 2182450B40	0.56 ± 10%; 500 V (H)
C45	2105311E08	13 (M)
	or 2105311E17	11 (H)
C46	2182450B22	0.75 ± 10%; 500 V (M)
	or 2182450B41	0.62 ± 10%; 500 V (H)
C47	2105311E04	10 (M)
	or 2100867807	8; 75 V; N080 (H)
		COIL, RF: unless stated
L1, 2, 3, 4	2405262E08	Coded: YEL, 4-1/2 turns spacewound; includes: 7605374B03 CORE
L5	2405262E06	Coded: BLK, 22-1/2 turns closewound; includes: 7605374B02 CORE
L6	2405262E08	Coded: YEL, 4-1/2 turns spacewound; includes: 7605374B03 CORE
L7	2405262E05	Coded: BLUE, 4-1/2 turns spacewound tapped at 3-1/4 turns; includes: 7605374B03 CORE
		RESISTOR, Fixed: ohm ± 10%; 1/8 W unless stated
R4	0600185A69	6.8 k ± 5%
R6	0600185A51	1.2 k ± 5%


SHOWN FROM SOLDER SIDE
M1
M2
M101
OMITTED FOR DIGITAL "PL" RADIOS
ADD FOR DIGITAL "PL" RADIOS ONLY
HIGH POWER RADIOS ONLY
BLU DOT
*RED DOT
*RED DOT
* MOUNTED ON SOLDER SIDE
SS-EEPF-8240-0
CS-EEPF-8241-0
OL-EEPF-8242-0